WOODSTOCK

SHOP FOX®

INTERNATIONAL

MODEL M1098
13 X 40 GEAR HEAD LATHE

OWNER'S MANUAL

(FOR MODELS MANUFACTURED SINCE 12/09)

Phone: (360) 734-3482 • On-Line Technical Support: tech-support@shopfox.biz

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WARNING: NO PORTION OF THIS MANUAL MAY BE REPRODUCED IN ANY SHAPE OR FORM WITHOUT THE WRITTEN APPROVAL OF WOODSTOCK INTERNATIONAL, INC.

#7622CR

Printed in China

⚠ WARNING!

This manual provides critical safety instructions on the proper setup, operation, maintenance and service of this machine/equipment.

Failure to read, understand and follow the instructions given in this manual may result in serious personal injury, including amputation, electrocution or death.

The owner of this machine/equipment is solely responsible for its safe use. This responsibility includes but is not limited to proper installation in a safe environment, personnel training and usage authorization, proper inspection and maintenance, manual availability and comprehension, application of safety devices, blade/cutter integrity, and the usage of personal protective equipment.

The manufacturer will not be held liable for injury or property damage from negligence, improper training, machine modifications or misuse.

⚠ WARNING!

Some dust created by power sanding, sawing, grinding, drilling, and other construction activities contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm. Some examples of these chemicals are:

- **Lead from lead-based paints.**
- **Crystalline silica from bricks, cement and other masonry products.**
- **Arsenic and chromium from chemically-treated lumber.**

Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals: Work in a well ventilated area, and work with approved safety equipment, such as those dust masks that are specially designed to filter out microscopic particles.

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INTRODUCTION

Woodstock Technical Support

We stand behind our machines! In the event that questions arise about your machine, parts are missing, or a defect is found, please contact Woodstock International Technical Support at (360) 734-3482 or send e-mail to: **tech-support@shopfox.biz**. Our knowledgeable staff will help you troubleshoot problems and send out parts for warranty.

If you need the latest edition of this manual, you can download it from **http://www.shopfox.biz**.
If you still have questions after reading the latest manual, or if you have comments please contact us at:

Woodstock International, Inc.
Attn: Technical Support Department
P.O. Box 2309
Bellingham, WA 98227

About Your New 13 x 40 Gear Head Lathe

Your new **SHOP FOX®** 13 x 40 Gear Head Lathe has been specially designed to provide many years of trouble-free service. Close attention to detail, ruggedly built parts and a rigid quality control program assure safe and reliable operation.

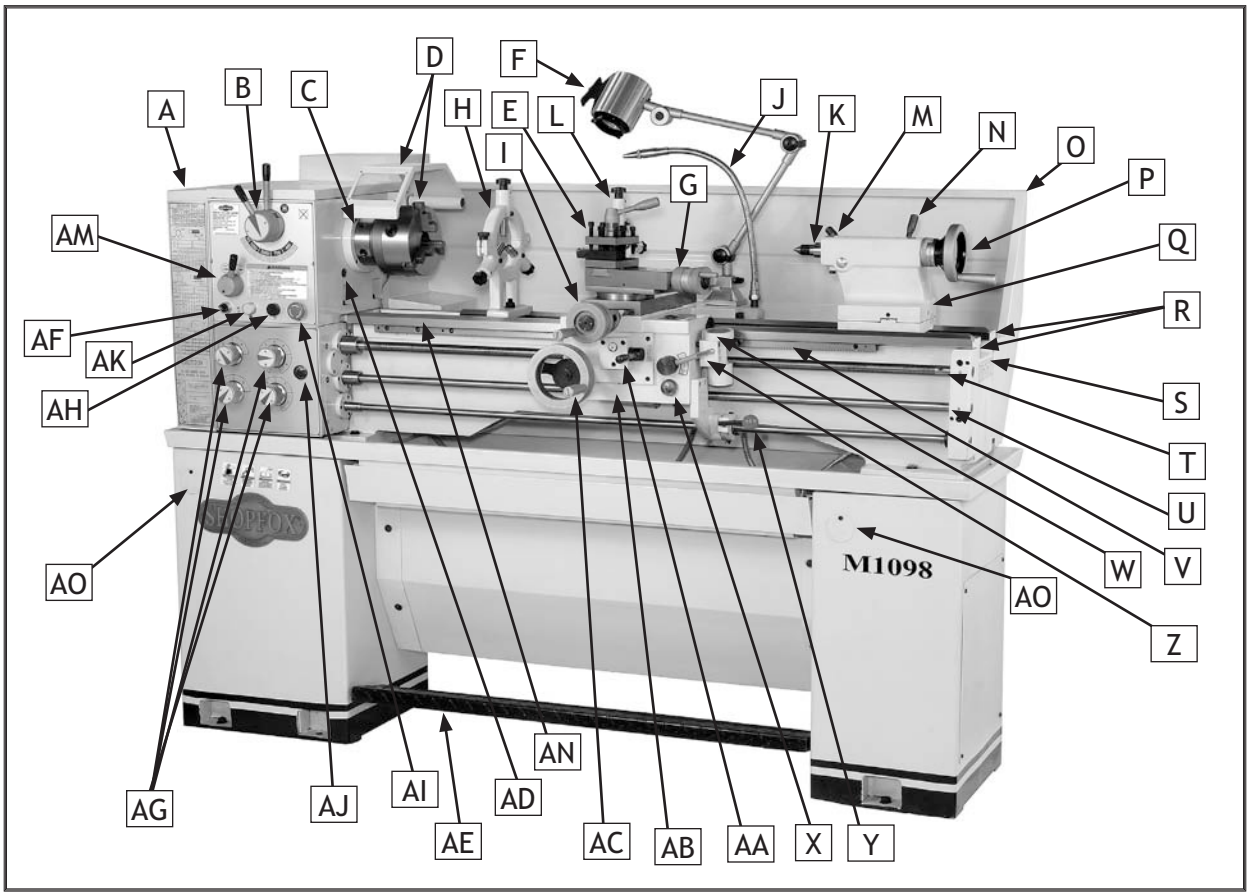
The Model M1098 Gear Head Lathe has precision-ground induction-hardened ways, removable gap with 40" between centers, an oil-bath headstock, threading gearbox, and apron. The 2 HP, 220V, 3-phase motor drives the spindle at eight speeds. The four-way turret style tool post assures rigid tool holding and accurate positioning. The Model M1098 includes a coolant pump, steady and follow rests, three and four-jaw chucks, a 10" faceplate, and an MT#3 tailstock taper. The lathe is made of cast iron throughout and has flame-hardened headstock gears.

Woodstock International, Inc. is committed to customer satisfaction in providing this manual. It is our intent to make sure all the information necessary for safety, ease of assembly, practical use and durability of this product be included.

Specifications

Spindle Motor	2 HP, 6.5 A, 1.5 KW, 220V, Three-Phase, 1725 RPM
Overall Length	78"
Overall Depth	29.5"
Footprint	70.5" x 15.5"
Height	52.5"
Bed Width	7.3"
Swing Over Bed	13"
Swing Over Gap	18.3"
Swing Over Saddle	7.8"
Distance Between Centers	40"
Height of Center Line	6.5"
Compound Slide Travel	3.2"
Cross Slide Travel	6.3"
Tailstock Barrel Travel	3.9"
Leadscrew Diameter	22 mm
Feed Rod	19 mm
Cutting Tool Maximum Size	16 X 16 mm
Camlock System	D1-4
Spindle Bore	1.5"
Spindle Taper	MT#5
Tailstock Diameter	32 mm
Tailstock Taper	MT#3
Spindle Speeds	70-2000 RPM
Feed Rate Range	0.14-0.376 mm/r
Thread Range (Inch)	2.25–40 TPI
Thread Range (Metric)	0.4-7 mm
Bed Ways	1660 x 186 x 308 mm
Longitudal Feed	0.052-1.392 mm/r
Cross Feed	0.014-0.376 mm/r
Approximate Shipping Weight	1433 lbs.
Approximate Net Weight	1279 lbs.

Controls and Features



The Model M1098 lathe.

A. Headstock
B. Spindle Speed Levers
C. Spindle
D. Chuck and Chuck Guard
E. Four-Way Tool Post
F. Work Light
G. Compound Rest and Handwheel
H. Steady Rest
I. Cross Slide and Handwheel
J. Coolant Hose
K. Dead Center and Quill
L. Follow Rest
M. Quill Lock
N. Tailstock Lock
O. Splash Guard
P. Tailstock Handwheel
Q. Tailstock
R. Bed Ways
S. Bed
T. Lead Screw
U. Feed Rod
V. Rack
W. Thread Dial
X. Apron Oil Level Sight Glass
Y. Spindle Rotation ON/OFF
Z. Half-Nut Lever
AA. Power Feed Lever
AB. Carriage Apron
AC. Longitudinal Feed Handwheel
AD. Headstock Oil Level Sight Glass
AE. Foot Brake
AF. Coolant Pump ON/OFF
AG. Thread Selection Dials
AH. Jog Button
AI. Emergency Stop
AJ. Oil Level Sight Glass
AK. Power Lamp
AM. Lead Screw/Feed Rod Direction Lever
AN. Gap
AO. Lathe lifting location (4 locations)

SAFETY

READ MANUAL BEFORE OPERATING MACHINE. FAILURE TO FOLLOW INSTRUCTIONS BELOW WILL RESULT IN PERSONAL INJURY.

⚠DANGER Indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.

⚠WARNING Indicates a potentially hazardous situation which, if not avoided, COULD result in death or serious injury.

⚠CAUTION Indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury.

NOTICE This symbol is used to alert the user to useful information about proper operation of the equipment, and/or a situation that may cause damage to the machinery.

Standard Safety Instructions

1. **Thoroughly read the Instruction Manual before operating your machine.** Learn the applications, limitations and potential hazards of this machine. Keep the manual in a safe and convenient place for future reference.

2. **Keep work area clean and well lighted.** Clutter and inadequate lighting invite potential hazards.

3. **Ground all tools.** If a machine is equipped with a three-prong plug, it must be plugged into a three-hole grounded electrical receptacle or grounded extension cord. If using an adapter to aid in accommodating a two-hole receptacle, ground using a screw to a known ground.

4. **Wear eye protection at all times.** Use safety glasses with side shields or safety goggles that meet the appropriate standards of the American National Standards Institute (ANSI).

5. **Avoid dangerous environments.** Do not operate this machine in wet or open flame environments. Airborne dust particles could cause an explosion and severe fire hazard.

6. **Ensure all guards are securely in place** and in working condition.

7. **Make sure switch is in the *OFF* position** before connecting power to machine.

8. **Keep work area clean,** free of clutter, grease, etc.

9. **Keep children and visitors away.** Visitors must be kept at a safe distance while operating unit.

10. **Childproof your workshop** with padlocks, master switches or by removing starter keys.

11. **Stop and disconnect the machine when cleaning, adjusting or servicing.**

12. **Do not force tool.** The machine will do a safer and better job at the rate for which it was designed.

13. **Use correct tool.** Do not force machine or attachment to do a job for which it was not designed.

14. **Wear proper apparel.** Do not wear loose clothing, neck ties, gloves, jewelry, and secure long hair away from moving parts.

15. **Remove chuck keys, rags, and tools.** Before turning the machine on, make it a habit to check that all chuck keys and wrenches have been removed.

16. **Avoid using an extension cord.** But if you must use one, examine the extension cord to ensure it is in good condition. Immediately replace a damaged extension cord. Always use an extension cord that uses a ground pin and connected ground wire. Use an extension cord that meets the amp rating on the motor nameplate. If the motor is dual voltage, be sure to use the amp rating for the voltage you will be using. If you use an extension cord with an undersized gauge or one that is too long, excessive heat will be generated within the circuit, increasing the chance of a fire or damage to the circuit.

17. **Keep proper footing and balance** at all times.

18. **Lock the mobile base from moving before feeding the workpiece into the machine**.

19. **Do not leave machine unattended.** Wait until it comes to a complete stop before leaving the area.

20. **Perform machine maintenance and care.** Follow lubrication and accessory attachment instructions in the manual.

21. **Keep machine away from open flame.** Operating machines near pilot lights or open flames creates a high risk if dust is dispersed in the area. Dust particles and an ignition source may cause an explosion. Do not operate the machine in high-risk areas, including but not limited to, those mentioned above.

22. **If at any time you are experiencing** difficulties performing the intended operation, stop using the machine! Then contact our technical support or ask a qualified expert how the operation should be performed.

23. **Be aware that certain materials may cause an allergic reaction in people and animals**, especially when exposed to fine dust. Make sure you know what type of material dust you will be exposed to and the possibility of an allergic reaction.

24. **Habits—good and bad—are hard to break.** Develop good habits in your shop and safety will become second-nature to you.

Additional Safety Instructions for Gear Head Lathes

⚠WARNING

READ and understand this entire instruction manual before using this machine. Serious personal injury may occur if safety and operational information is not understood and followed. DO NOT risk your safety by not reading!

⚠CAUTION

USE this and other machinery with caution and respect. Always consider safety first, as it applies to your individual working conditions. No list of safety guidelines can be complete—every shop environment is different. Failure to follow guidelines could result in serious personal injury, damage to equipment or poor work results.

1. **Read and understand this manual before operating this machine.**

2. **Do not clear chips by hand.** Use a brush, and never clear chips while the lathe is turning.

3. **Always select the right cutter for the job, and make sure cutters are sharp.** The right tool decreases strain on the lathe components and provides a better finish.

4. **Always remove chuck key.** Never walk away from the lathe with the key in the chuck.

5. **Make sure workpiece is properly held in chuck before starting lathe.** A workpiece thrown from the chuck will severely injure you or a bystander.

6. **Turn lathe *OFF* before changing speeds.** The lathe must be turned ***OFF*** and the spindle brought to a complete stop before changing gears.

7. **Get assistance when installing large chucks.** Large lathe chucks are very heavy and awkward to hold, so protect your hands and the precision ground ways. Always use a chuck cradle or piece of plywood over the ways of the lathe.

8. **Supporting long workpieces** if a workpiece extends out of the end of the headstock for a turning operation, make sure it is supported as not to wobble violently when the lathe is turned on.

9. **Make sure workpiece has adequate clearance before starting machine.** Check tool and tool post clearance, chuck clearance, and saddle clearance before starting the lathe.

10. **Always use the appropriate feed and speed rates.**

11. **Never attempt to slow or stop the lathe chuck by using your hand.**

12. **Maintaining a safe workplace.** Never leave lathe unattended while it is running.

13. **Avoiding a severe entanglement injury.** Long hair, ponytails, loose clothing and sleeves is an entanglement hazard. Make sure they are all tied out of the way and do not dangle.

14. **Preventing lathe crashes.** Release any automatic feeds after completing a job.

Avoiding Potential Injuries

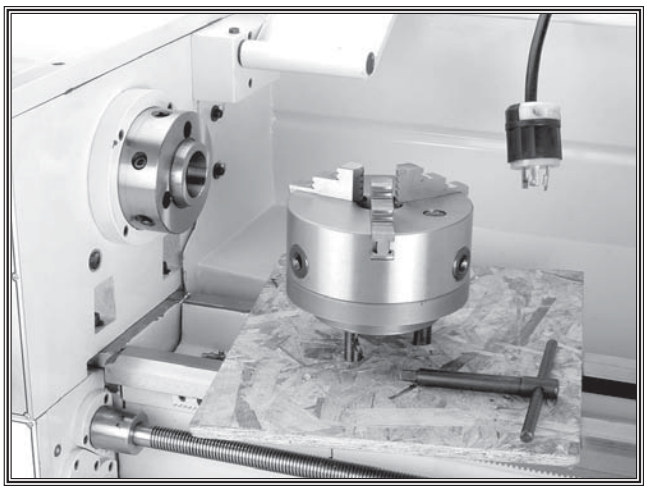


Figure 1. Always protect the bed ways, and unplug the lathe when retooling the lathe.

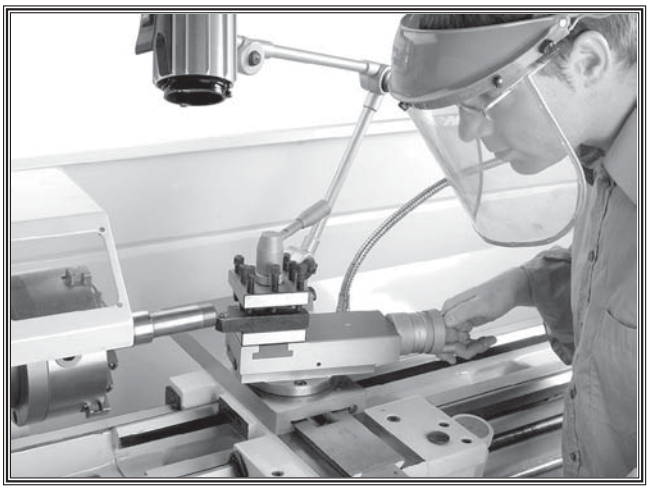


Figure 3. Always wear face and eye protection when using lathes.

Figure 2. Never walk away from the lathe leaving the chuck key inserted in the chuck.

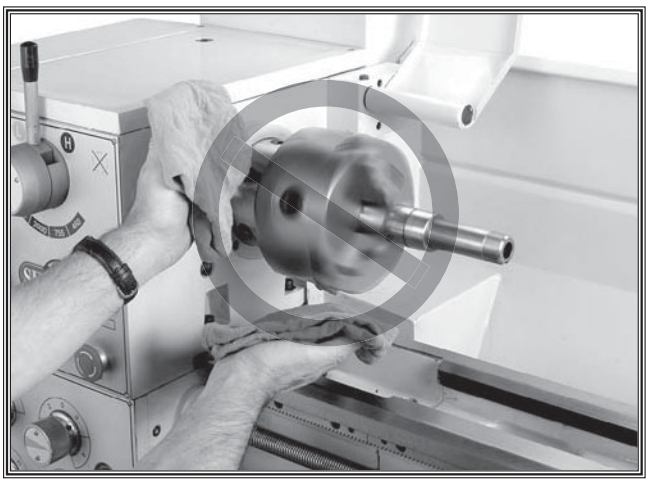


Figure 4. Never use hands to stop or slow the chuck when shutting down the lathe.

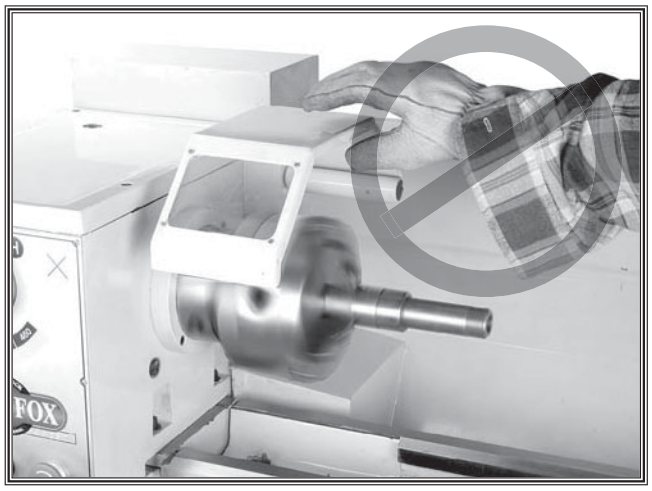


Figure 5. Never wear loose clothing or gloves when working with the lathe.

220V 3-phase Operation

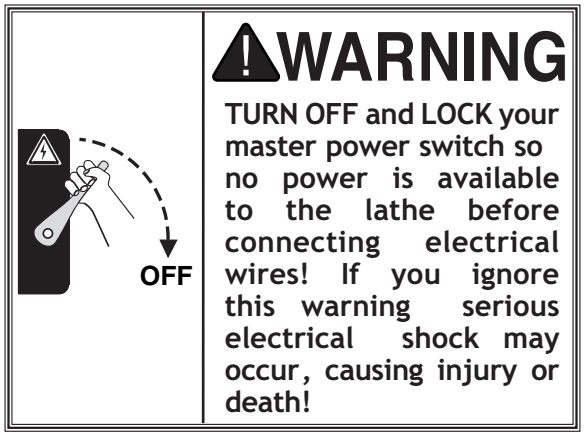
The **SHOP FOX®** Model M1098 power supply requirement is 220 volt, three-phase. If you do not have three-phase power available, you will have to install a phase converter.

We recommend that you hard-wire this lathe to a dedicated circuit with a verified ground, using the circuit breaker size given below. Never replace a circuit breaker with one of higher amperage without consulting a qualified electrician to ensure compliance with wiring codes. **If you are unsure about the wiring codes in your area or you plan to connect your machine to a shared circuit, you may create a fire hazard—consult a qualified electrician to reduce this risk.**

If you must use a plug and receptacle, you will need a NEMA-style 15-15 plug and receptacle (**see Figure 6**).

⚠ **CAUTION:** Using a circuit breaker rated higher than 10 amps will increase the risk of fire!

WARNING
DO NOT attempt to work on your shop electrical system if you are unsure about electrical codes and wiring! Seek assistance from a qualified electrician. Ignoring this warning can cause electrocution!


OFF
WARNING
TURN OFF and LOCK your master power switch so no power is available to the lathe before connecting electrical wires! If you ignore this warning serious electrical shock may occur, causing injury or death!

Extension Cords

DO NOT use an extension cord for 220V/440V high amperage industrial shop machines. You must follow all local electrical codes when connecting this machine to a power source.

Grounding

This machine must be grounded! If you have any questions about correct electrical installation, contact a qualified electrician for assistance to make sure all connections are safe and adhere to your local electrical codes.

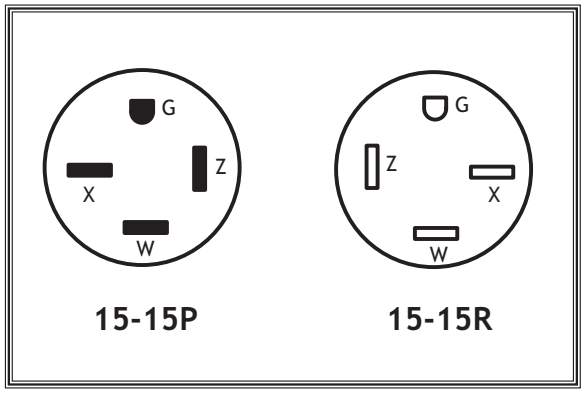


Figure 6. Typical 220V 3-phase 15 Amp 4-prong plug and receptacle.

SET UP

Unpacking

The **SHOP FOX®** Model M1098 has been carefully packaged for safe transporting. If you notice the machine has been damaged, please contact your authorized **SHOP FOX®** dealer immediately.

Items Needed for Set Up

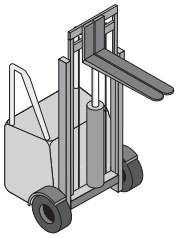
The following items are needed, but not included, to setup your machine:

- Fork Lift or 1.5-Ton Hoist
- 1.5 Ton lifting straps and hooks
- Precision Level
- Safety Glasses (for each person)
- Solvent for cleaning
- Shop Rags for cleaning
- Floor Anchors

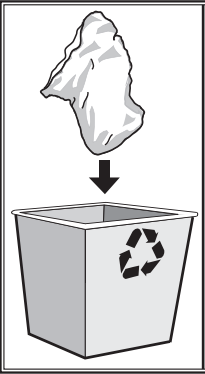
⚠WARNING

READ and understand this entire instruction manual before using this machine. Serious personal injury may occur if safety and operational information is not understood and followed. DO NOT risk your safety by not reading!

⚠WARNING



The Model M1098 weighs approximately 1280 lbs. Serious personal injury may occur if safe moving methods are not followed. You will need power lifting equipment and assistance to remove this machine from the crate. Otherwise, serious personal injury may occur.



⚠WARNING

SUFFOCATION HAZARD!

Immediately discard all plastic bags and packing materials to eliminate choking/suffocation hazards for children and animals.

Inventory

The following is a description of the main components shipped with the **SHOP FOX®** Model M1098. Lay the components out to inventory them.

Main Contents (Figure 7) **QTY**
A. Model M1098 Gear Head Lathe.....1
B. Steady Rest.....1
C. Follow Rest.....1
D. Three-Jaw Chuck.....1

Accessory Mountings (Figure 8)
E. 10" Faceplate.....1
R. 8" Four-Jaw Universal Chuck.....1
G. Four-Jaw Chuck Key.....1
H. Hardware Bag
- Camlock Studs.....3
- Camlock Stud Fasteners.....3

Tool Box Content (Figure 9)
I. Tool Box.....1
J. Oil Gun.....1
K. Open End Wrenches 10/12, 14/17, 17/19.....1 EA
L. Slotted Screwdriver.....1
M. Phillips Head Screwdriver.....1
N. Three-Jaw Chuck Jaws.....3
O. Hex Wrenches 3, 4, 5, 6, 8, 10MM.....1 EA
P. MT#3 Dead Centers.....2
Q. MT#5-#3 Morse Taper Sleeve.....1
R. Center Sleeve MT#5 to MT#3.....1
S. Three-Jaw Chuck Key.....1
T. Tool Post Wrench.....1
U. Change Gear 40T).....1

If any parts appear to be missing, examine the packaging carefully to be sure those parts are not among the packing materials. If any parts are missing, find the part number in the back of this manual and contact Woodstock International, Inc. at (360) 734-3482 or at tech-support@shopfox.biz

NOTICE

When ordering replacement parts, refer to the parts list and diagram in the back of the manual.

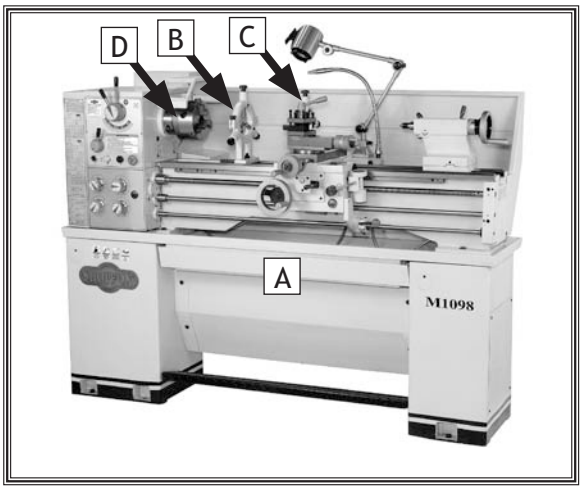


Figure 7. Main contents.

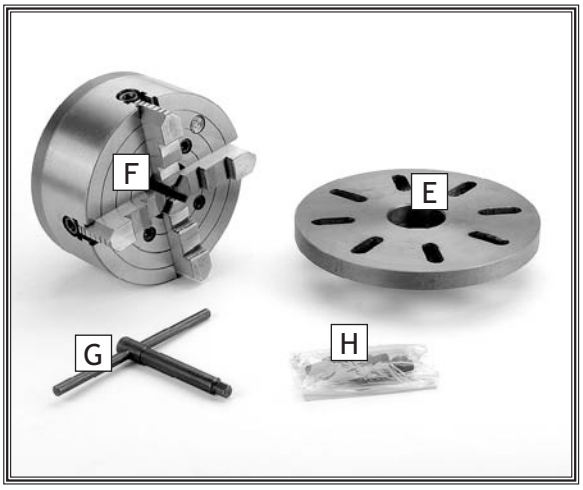


Figure 8. Accessories.

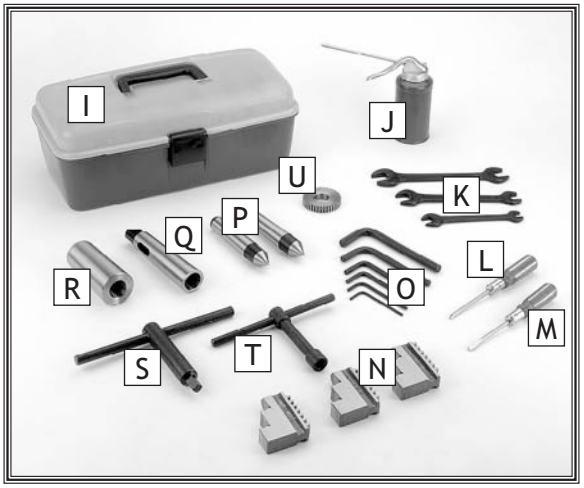


Figure 9. Tool box contents.

SETUP

Cleaning Machine

The ways and other unpainted parts of your Gear Head Lathe are coated with a waxy grease that protects them from corrosion during shipment. Clean this grease off with a solvent cleaner or citrus-based degreaser. DO NOT use chlorine-based solvents such as brake parts cleaner or acetone—if you happen to splash some onto a painted surface, you will ruin the finish.

⚠CAUTION

ALWAYS work in well-ventilated areas far from possible ignition sources when using solvents to clean machinery. Many solvents are toxic when inhaled or ingested. Use care when disposing of waste rags and towels to be sure they DO NOT create fire or environmental hazards.

⚠WARNING

NEVER use flammables such as gas or other petroleum-based solvents to clean your machine. These products have low flash points and present the risk of explosion and severe personal injury!

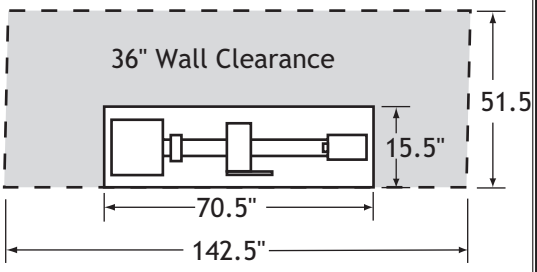


Figure 10. Minimum wall clearances.

Machine Placement

- **Floor Load:** Your Gear Head Lathe represents a large load (1279 Lbs.) distributed in a 70½" x 15½" footprint. We recommend placing this machine on concrete floors only.

- **Working Clearances:** Consider existing and anticipated needs, size of material to be processed through the machine, and space for auxiliary stands, work tables or other machinery when establishing a location for your gear head lathe (see **Figure 10**).

- **Lighting:** Lighting should be bright enough to eliminate shadow and prevent eye strain.

- **Electrical:** Electrical circuits must be dedicated or large enough to handle amperage requirements. Outlets must be located near each machine, so power or extension cords are clear of high-traffic areas. Follow local electrical codes for proper installation of new lighting, outlets, or circuits.

⚠WARNING

MAKE your shop "child safe." Ensure that your workplace is inaccessible to youngsters by closing and locking all entrances when you are away. NEVER allow untrained visitors in your shop when assembling, adjusting or operating equipment.

Mounting Lathe on Shop Floor

Although not required, we recommend that you mount your new machine to the floor. Because this is an optional step and floor materials may vary, floor mounting hardware is not included. Generally, you can either bolt your machine to the floor or mount it on machine mounts. Both options are described below. Whichever option you choose, it will be necessary to use a precision level to level your machine.

Bolting to Concrete Floors

Lag shield anchors with lag bolts (**Figure 11**) and anchor studs (**Figure 12**) are two popular methods for anchoring an object to a concrete floor. We suggest you research the many options and methods for mounting your machine and choose the best that fits your specific application.

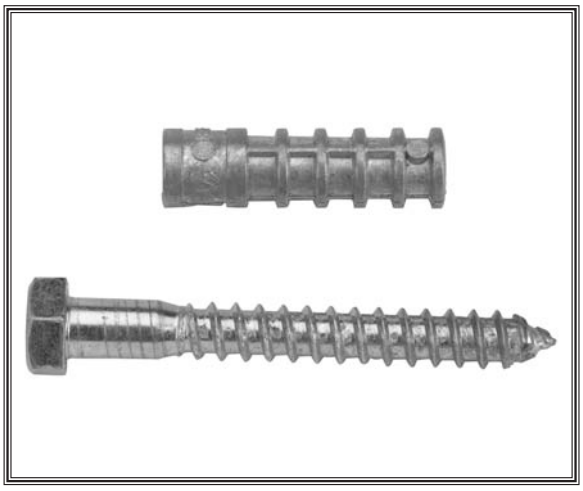


Figure 11. Typical lag shield anchor and lag bolt.

NOTICE

Anchor studs are stronger and more permanent alternatives to lag shield anchors; however, they will stick out of the floor, which may cause a tripping hazard if you decide to move your machine at a later point.

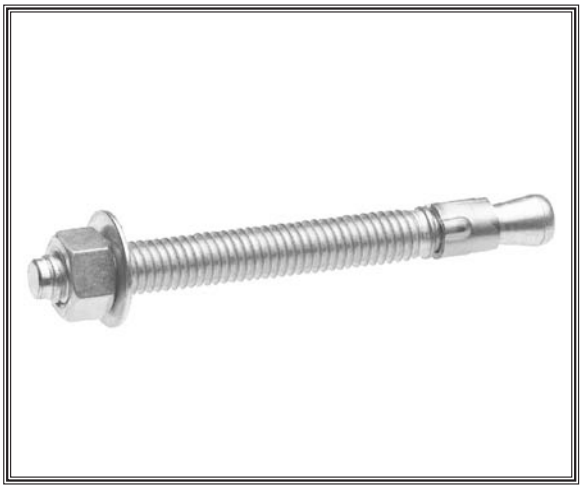


Figure 12. Typical anchor stud.

Using Machine Mounts

Using machine mounts, shown in **Figure 13**, gives the advantage of fast leveling and vibration reduction. The large size of the foot pads distributes the weight of the machine to reduce strain on the floor.

Figure 13. Machine mount example.

Handwheel Handles

To attach the handles, do these steps:

Using the screwdriver, attach the handles (**Figure 14**) to the threaded hole in the handwheels.

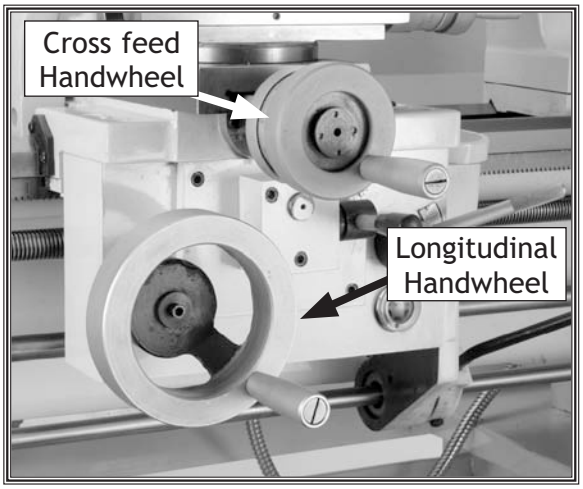


Figure 14. Longitudinal and cross feed handle locations.

Test Run

The purpose of the test run is to make sure the lathe operates correctly before proceeding with additional set up. Check to make sure that the auto feed is not engaged, the chuck is secure in the spindle, and there are no loose parts around the spindle. Set the lathe to the slowest RPM before the test run.

To begin the test run procedure, do these steps:

1. Make sure there are no obstructions around or underneath the spindle.

2. Make sure the lathe is lubricated and all gear box oil levels are full. Refer to **Lubrication** on **Page 39**.

3. Set the lathe to **190 RPM**. Refer to **Page 33** to adjust RPM.

4. Put on safety glasses, and make sure any bystanders are wearing safety glasses and are out of the way.

5. Plug the lathe in, or move the power supply lever at the power supply panel to ***ON***. The power lamp on the lathe will then illuminate.

   - If it does not illuminate, disconnect power to the machine, and inside of the main electrical box, move the circuit breaker to the ***ON*** position.

6. Move the **Spindle Rotation ON/OFF** lever so the chuck turns. The lathe should run smoothly, with little or no vibration or rubbing noises.

   - If you hear squealing or grinding noises, turn the machine ***OFF*** immediately and unplug the machine. Correct any problem before further operation.

   - If the the problem is not readily apparent, refer to **Troubleshooting** on **Page 48**.

7. Turn the lathe ***OFF*** and complete the **Spindle Break-In** on **Page 34** before using the lathe.

OPERATIONS

General

NOTICE

Complete the **Spindle Break-In** procedure on **Page 34** before using this lathe for any cutting or threading operations. **Otherwise gear box damage will occur.**

The Model M1098 will perform many types of operations that are beyond the scope of this manual. Many of these operations can be dangerous or deadly if performed incorrectly.

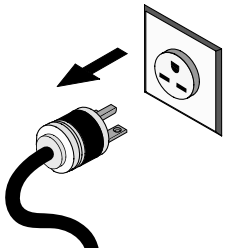
The instructions in this section are written with the understanding that the operator has the necessary knowledge and skills to operate this machine. **If at any time you are experiencing difficulties performing any operation, stop using the machine!**

If you are an inexperienced operator, we strongly recommend that you read books, trade articles, or seek training from an experienced lathe operator before performing any unfamiliar operations. **Above all, your safety should come first!**

WARNING

Always wear safety glasses when operating the Gear Head Lathe. Failure to comply may result in serious personal injury requiring an eye patch.

WARNING



DO NOT investigate problems or adjust the Gear Head Lathe while it is running. Wait until the machine is turned off, unplugged and all working parts have come to a complete stop before proceeding!

Turning On Power

See **Figure 15**, once plugged in, there is power to the lathe at all times unless it is unplugged or the main power panel lever is moved to the ***OFF*** position. When illuminated, the power light on the lathe indicates that the power is being supplied to the lathe. If you press the emergency stop button, the power light will go out and cut power to potential machine operations only. Twisting the EMERGENCY STOP button and letting it pop out will restore power to machine operations. To completely, cut all power to the lathe, it must be unplugged, or the main shop power supply lever must be moved and locked in the ***OFF*** position.

Note: *The **Spindle Rotation ON/OFF Lever** on the apron starts the spindle motor in a particular direction.*

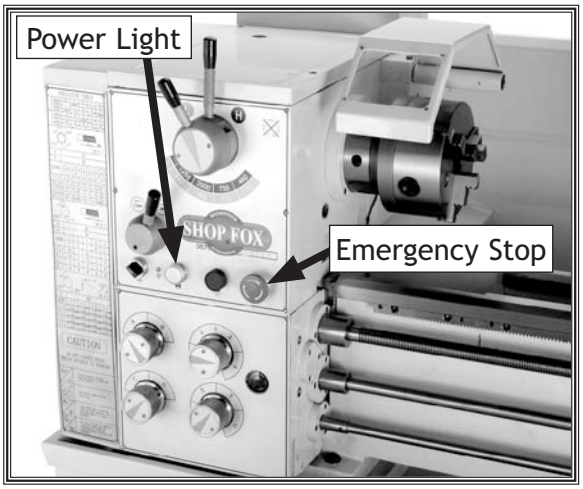


Figure 15. Power light and emergency stop locations.

Three-Jaw Direct Mount Scroll Chuck

Three-jaw scroll chucks feature hardened steel jaws that self-center the workpiece within 0.002"-0.003". An extra set of jaws is included for machining larger workpieces. The three-jaw direct mount scroll chuck featured in these instructions has three cam-lock studs that mount directly to the chuck and hold the chuck tight to the spindle nose.

To remove or mount your three-jaw direct mount scroll chuck you will need the following tools:

- Chuck Key
- Dead Blow Hammer
- A Chuck Cradle or a piece of plywood large enough to span the bedways and support the weight of the chuck
- Breaker Bar (optional)

To remove the existing chuck, do these steps:

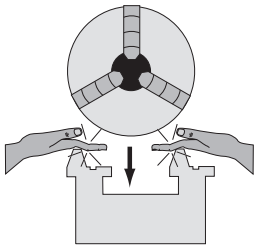
1. DISCONNECT POWER TO THE LATHE!

2. Lay a chuck cradle or protective layer of plywood over the bedways to protect the precision ground surfaces from damage and to prevent fingers from being pinched (see **Figure 16**).

3. Loosen the 3 cam-locks by turning the chuck key counterclockwise until the mark on the cam-lock aligns with the single mark on the spindle nose in **Figure 17.** This will be approximately one-third of a turn. If you look carefully, you will see the cam-lock rise up out of the spindle nose. If the cam-lock stud does not freely release from the cam-lock, wiggle the cam-lock until the cam-lock stud releases.

   Note: *These cam-locks may be very tight. A breaker bar may be used to add leverage.*

⚠WARNING



PINCH HAZARD! Protect your hands and precision ground bedways with plywood when removing lathe chuck! The heavy weight of a falling chuck can cause serious injury.

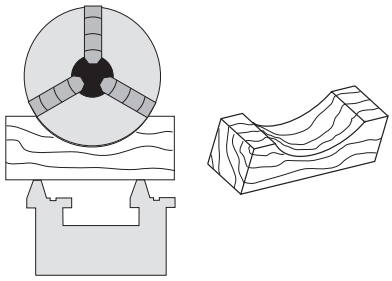


Figure 16. Simple chuck cradle made of scrap lumber.

Figure 17. Loosening the cam-locks.

4. Using a dead blow hammer or other soft mallet, lightly tap around the outer circumference of the chuck body to break the chuck free from the cam-locks and from the spindle nose taper.

⚠CAUTION

Large chucks are very heavy. Always get assistance when removing or installing large chucks to prevent personal injury or damage to the chuck or lathe.

5. With a rocking motion, carefully remove the chuck from the spindle nose (see **Figure 18**).

Figure 18. Installing and removing a small chuck.

To install the three-jaw scroll chuck, do these steps:

1. DISCONNECT POWER TO THE LATHE!

2. Lay a chuck cradle or protective layer of plywood over the bedways to protect the precision ground surfaces from damage and to prevent fingers from being pinched.

3. If the three-jaw scroll chuck does not have the cam-lock studs assembled, screw the cam-lock studs into the chuck body.

4. Measure the height of the cam-lock studs from the previously installed chuck (see **Figure 19**).

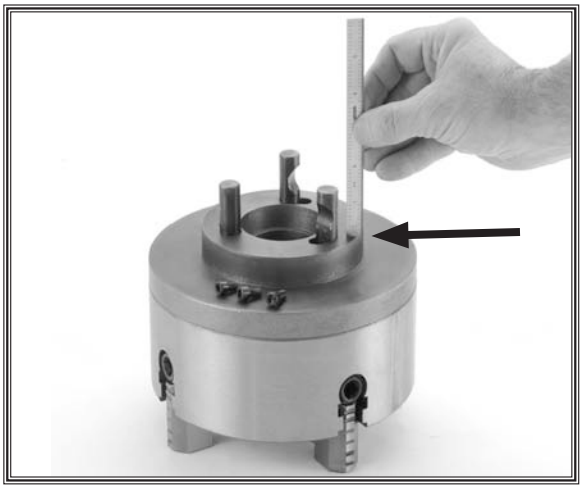


Figure 19. Measuring height of cam-lock studs.

5. Adjust the cam-lock studs in the three-jaw chuck to match the measurement from the previous chuck.

   Note: *Trial-and-error adjustment will be needed if you do not have a previous cam-lock stud to reference.*

6. Once the proper length is obtained, thread the cap screws to lock the cam-lock studs into position.

7. Lift the chuck, and insert the studs onto the spindle nose.

8. Tighten each cam-lock clockwise until you feel the cam-lock engage the cam-lock stud. Continue to turn until you can't turn any further. You will see the chuck body draw-up to the spindle nose. Ideally the cam-lock mark will fall between the two pointed arrows on the spindle nose (see **Figure 20**).

Figure 20. Tightening the cam-locks.

To load a workpiece, do these steps:

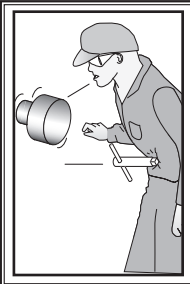
1. With the chuck key, open the jaws so the workpiece lays flat against the chuck face and jaw step, or fits in the through hole. For jaw and work holding options, see **Figure 21**.

2. Turn each jaw until it makes contact with the workpiece.

3. Turn the chuck by hand to make sure you have even contact with all three jaws and the workpiece is not off center.

   - If the workpiece is off center, loosen the jaws and adjust the workpiece.

   - If the workpiece is seated correctly, tighten the jaws.



⚠WARNING

Securely clamp your workpiece and remove the chuck key! Thrown objects from a lathe can cause serious injury or death to the operator and to bystanders many feet away.

Replacing Jaws

Three-jaw scroll chucks come with two sets of hardened steel jaws. The outside jaws are used to hold the workpiece from the outer diameter. The inside jaws are for holding larger work usually from the inside diameter. The inside jaws can hold a workpiece from the outside when held in the central position (see **Figure 21**).

The jaws are numbered 1-3 and must be installed in this sequence (see **Figure 22**).

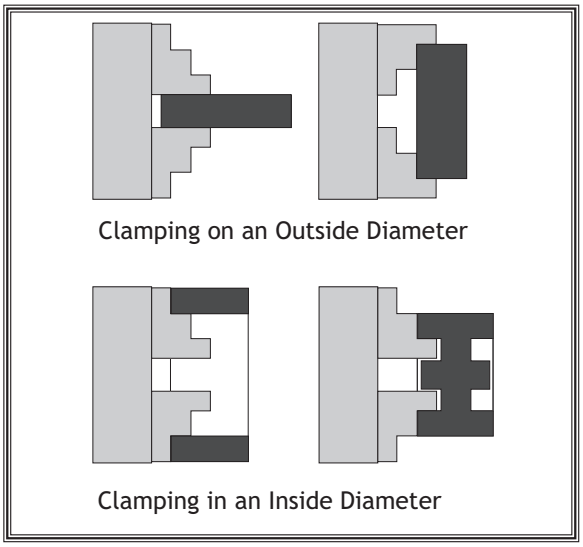


Figure 21. Loading a workpiece.

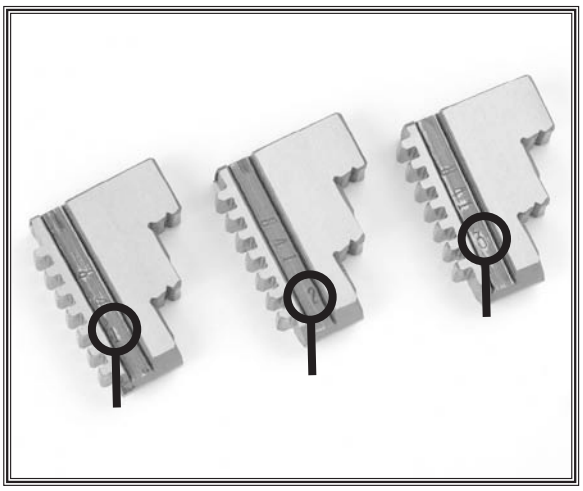


Figure 22. Jaw number identification.

To remove a set of jaws, do these steps:

1. DISCONNECT POWER TO THE LATHE!

2. Identify the jaw position by the number usually stamped on the side of the jaw groove (see **Figure 23**).

   Note: *The chuck has a number in the jaw guide that corresponds to the jaw number (see* ***Figure*** **23***). If it does not, locate the jaw number on the jaw and mark the chuck to identify that position.*

3. Turning the chuck key counterclockwise, back the jaws out of the chuck body. They will be released from the scroll thread in a reverse sequence.

4. Set the jaws aside in a safe place.

To install a set of jaws, do these steps:

1. DISCONNECT POWER TO THE LATHE!

2. Identify the jaw by the number stamped on the side.

3. Locate the corresponding jaw guide on the chuck body (see **Figure 24**).

4. Insert the chuck key into the chuck.

5. Look into the jaw guide and you will see the scroll rotating as you turn the chuck key. When the leading thread of the scroll comes into view at the top of the #1 jaw guide, stop turning the chuck key (see **Figure 25**).

6. Slide jaw #1 into the jaw guide until it stops.

7. Turn the chuck key so the leading thread of the scroll picks up the first thread on the jaw. When the lead thread engages, you will see the jaw being drawn to the center of the chuck (see **Figure 25**).

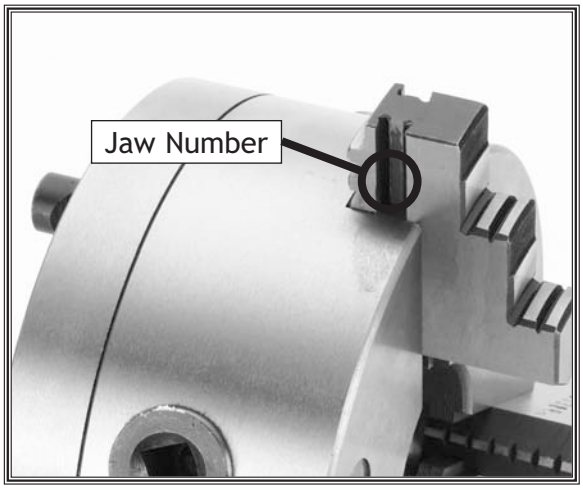


Figure 23. Typical jaw number location.

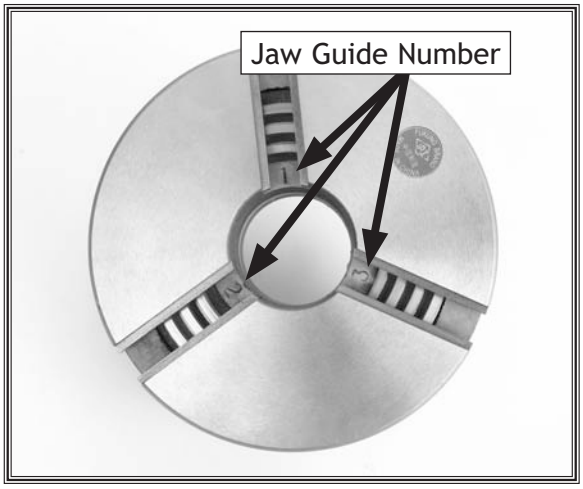


Figure 24. This chuck has jaw references on the inside of the jaw guide. (Chuck removed from spindle for clarity).

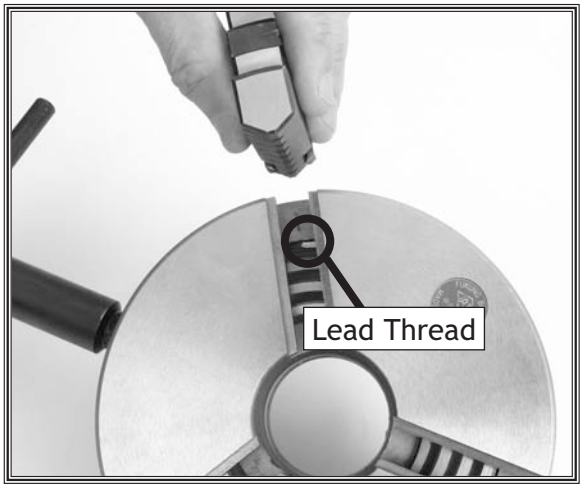


Figure 25. Lead thread on scroll.

8. Continue to turn the chuck key until the leading thread of the scroll comes to the second jaw guide (see **Figure 26**).

9. Repeat **Steps 5-7** with jaw #2.

10. Continue to turn the chuck key until the leading thread of the scroll comes to the third jaw guide.

11. Repeat **Steps 5-7** with jaw #3.

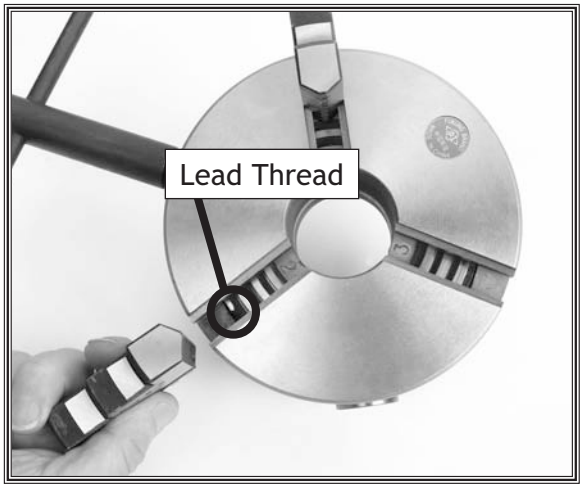


Figure 26. Lead thread coming in to view for jaw #2.

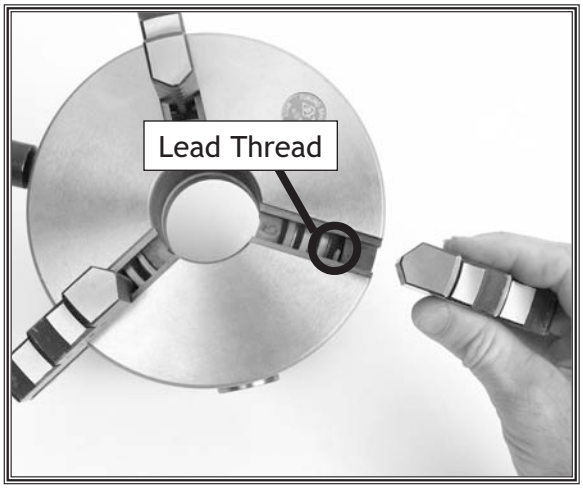


Figure 27. Lead thread coming in to view for jaw #3.

Four-Jaw Direct Mount Independent Chuck

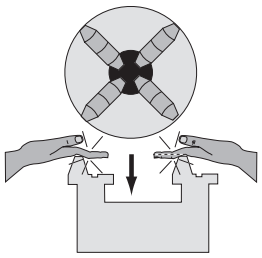
Four-jaw chucks feature hardened steel jaws that are adjusted independently. Each jaw can be removed from the chuck body and reversed. Independent jaw adjustment and reversal allows for a wide range of work holding versatility.

The four-jaw direct mount independent chuck featured in these instructions mounts the same way as the three-jaw chuck. Refer to the three-jaw chuck instructions beginning on **Page 17.**

⚠CAUTION

Large chucks are very heavy. Always have assistance when removing or installing large chucks to prevent personal injury or damage to the chuck or lathe.

⚠WARNING



PINCH HAZARD! Protect your hands and precision ground bedways with plywood when removing lathe chuck! The heavy weight of a falling chuck can cause serious injury.

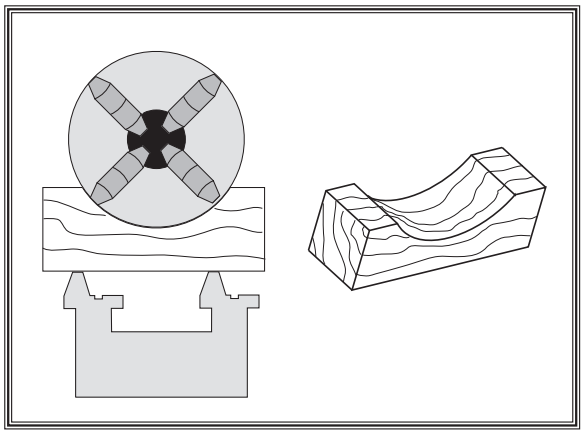


Figure 1. Simple chuck cradle made of scrap lumber.

To load a workpiece in the four-jaw chuck, do these steps:

1. Using the chuck key, open each jaw so the workpiece will lay flat against the chuck face.

2. Support the workpiece.

3. Lock the tailstock and then turn the tailstock quill so the dead center makes contact or is close to the center point of your workpiece (see **Figure 28**).

4. Turn each jaw until it just makes contact with the workpiece.

5. In an opposing pattern, tighten each jaw in small increments. After you have adjusted the first jaw, continue tightening the opposing jaw. Check the dead center alignment frequently to make sure you have not wandered off your index point due to applying too much pressure to a single jaw.

6. After the workpiece is held in place, back the tailstock away and rotate the chuck by hand. The center point will move if the workpiece is out of center.

7. Make fine adjustments by slightly loosening one jaw and tightening the opposing jaw until the workpiece is precisely aligned. Use a dial indicator for fine tuning adjustments in alignment (see **Figure 29**).

8. Use a lower RPM when machining heavy eccentric workpieces.

Figure 28. Clamping workpiece.

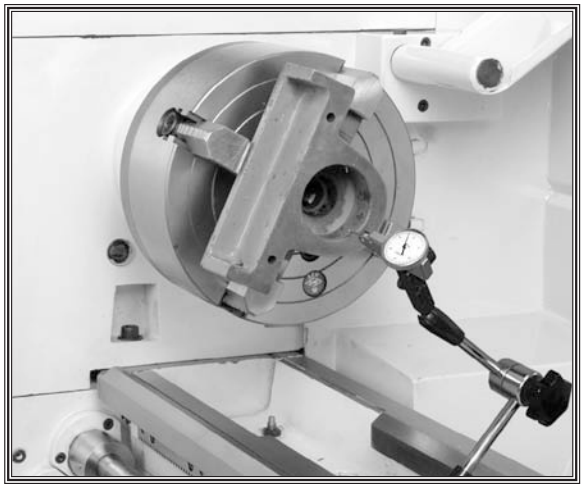


Figure 29. Centering workpiece.

Faceplate

The faceplate can be used to turn non-cylindrical parts or for off-center turning by clamping the workpiece to the faceplate.

To install the faceplate, do these steps:

Installing the faceplate follows the same steps as any of the lathe chucks. Install according to the instructions for three-jaw chucks found on **Page 17**.

To load a workpiece, do these steps:

1. Support the workpiece.
2. Slide the tailstock to the workpiece.
3. Lock the tailstock and then turn the tailstock quill so the dead center makes contact with the center point of your workpiece. For more information refer to **Centers** in this section on **Page 29.**
4. Lock the tailstock quill when sufficient pressure is applied to hold the workpiece in place. Depending on the workpiece, some additional support may be needed.
5. Secure the workpiece with a minimum of three independent clamping devices (see **Figure 30**). Failure to follow this step may lead to deadly injury to yourself or bystanders. Take into account rotation and the cutting forces applied to the workpiece when clamping to the faceplate. **Make sure your clamping application will not fail!**
6. Use a lower RPM when machining heavy eccentric workpieces.

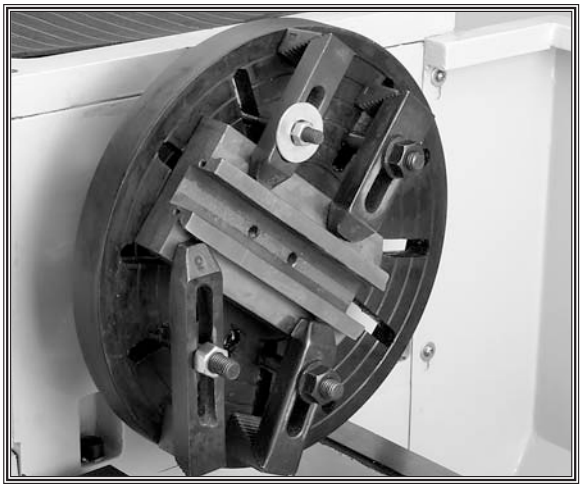
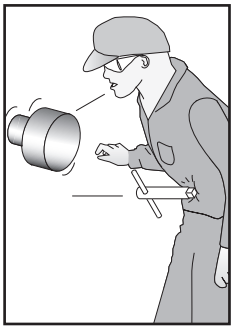


Figure 30. Typical faceplate with properly clamped workpiece in four locations.

⚠WARNING

Use a minimum of three independent clamping devices when turning eccentric workpieces. Failure to provide adequate clamping will cause workpiece to eject.

⚠WARNING



Securely clamp your workpiece and remove the chuck key! Thrown objects from a lathe can cause serious injury or death to the operator and to bystanders many feet away.

Gap Piece Removal

The Model M1098 comes equipped with a gap piece below the spindle that can be removed for turning large diameter parts or when using a large diameter faceplate.

The gap piece is installed, then ground at the factory during lathe assembly for precise fit and alignment. Factors during the remaining assembly apply additional forces to the gap; therefore, replacing the gap to the original position will be very difficult. **If you choose to remove the gap piece, we don't recommend attempting to replace it.**

To remove the gap piece, do these steps:

1. Find the two taper pin nuts located on the bed of the gap piece (see **Figure 31**).

2. Using an open-ended wrench, tighten the nut. This will cause the taper pin to release. Remove the taper pin and repeat for the second nut.

3. Remove the four socket head cap screws.

4. Tap the outside of the gap piece with a dead blow hammer to loosen, and remove the gap piece.

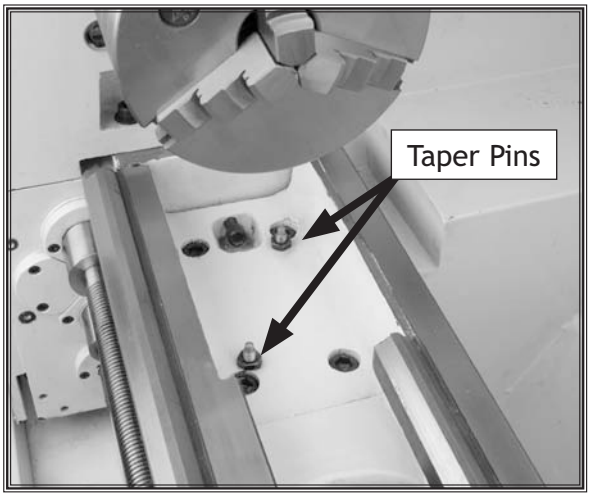


Figure 31. Lathe gap piece.

Tailstock

The tailstock (**Figure 32**) of the Model M1098 lathe can be used to support workpieces with the use of a live or dead center. It can drill or bore holes in the center of a part, using a drill chuck fitted with a #3 taper and a drill bit, or bypass the drill chuck and use a #3 tapered shank drill bit. Tthe tailstock can also be used for cutting shallow tapers by using the offset adjustment.

To operate the tailstock, do these steps:

1. Slide the tailstock to the desired position.
2. Pull up on the tailstock lock handle to lock the tailstock in place.

To operate the tailstock quill, do these steps:

1. With the tailstock locked, push down the quill lock handle to unlock.
2. Turn the quill feed handle clockwise to feed/move the quill towards the spindle, or counterclockwise to move away from the spindle.
3. Pull up on the quill lock handle to lock the quill in place.

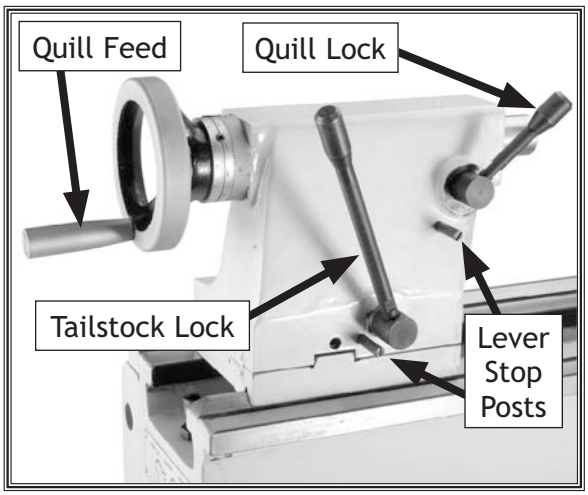


Figure 32. Tailstock and quill lock handles in locked position.

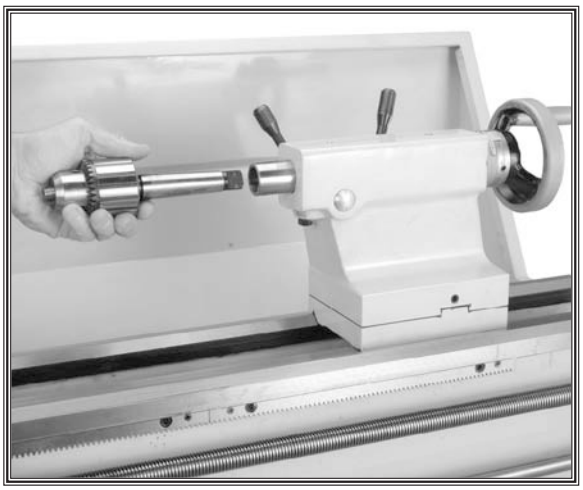


Figure 33. Setting up tailstock for drilling.

Drilling with the Tailstock

To install the tapered drill chuck, do these steps:

1. With the tailstock locked, push down to unlock the quill lock handle.
2. Turn the quill feed handle clockwise to extend the quill about one inch.
3. Insert a tapered drill arbor (**Figure 33**), or the tapered drill shank (**Figure 34**), into the quill until the taper is firmly seated. The matching tapers hold the arbor.
4. Turn the quill feed handle clockwise to feed the drill bit into the rotating workpiece.
5. To remove the chuck taper, turn the quill feed handle counterclockwise until the chuck is pushed out from the tailstock taper.

Figure 34. Tapered shank drill fitting into quill taper.

Cutting Shallow Tapers with the Tailstock

The tailstock can be offset to cut a shallow taper on a part.

To set up the tailstock to cut tapers, do these steps:

1. Lock the tailstock in position.
2. Loosen the lock screw (see **Figure 35**).
3. Alternately loosen and tighten the left and right jack screws until the desired offset is indicated on the scale (see **Figure 36**).
4. Retighten the lock screw.

   Note: *To return the tailstock back to the original position, repeat the process until the centered position is indicated on the scale.*

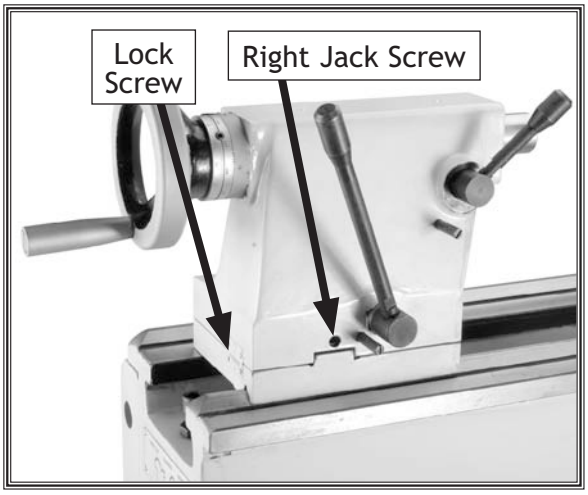


Figure 35. Tailstock off-set adjustments.

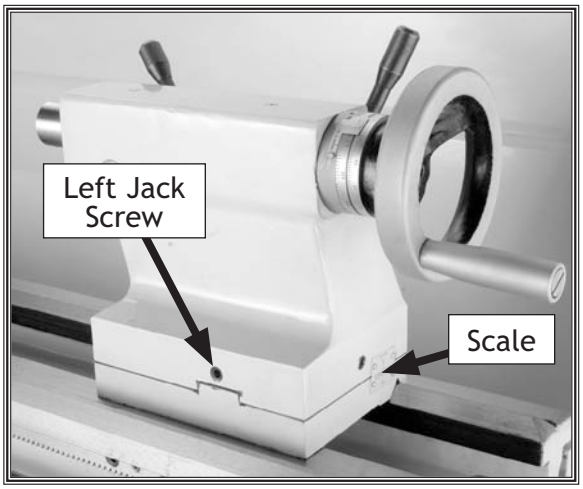


Figure 36. Off-set scale.

Tailstock Alignment

The tailstock on the Model M1098 is aligned at the factory with the headstock. We recommend that you take the time to ensure that the tailstock is aligned to your own desired tolerances.

To align the tailstock, do these steps:

1. Using a precision level on the bedways, make sure the lathe is level side-to-side and front-to-back. If the lathe is not level, correct this condition before proceeding.
2. Get two pieces of steel round stock, 2.00" in diameter x 6.00" long.
3. Center drill both ends of one piece of the round stock. Set it aside for use in **Step 6.**
4. Using the other piece of stock, make a dead center by turning a shoulder to make a shank. Flip the piece over in the chuck and turn a 60° point (see **Figure 37**).

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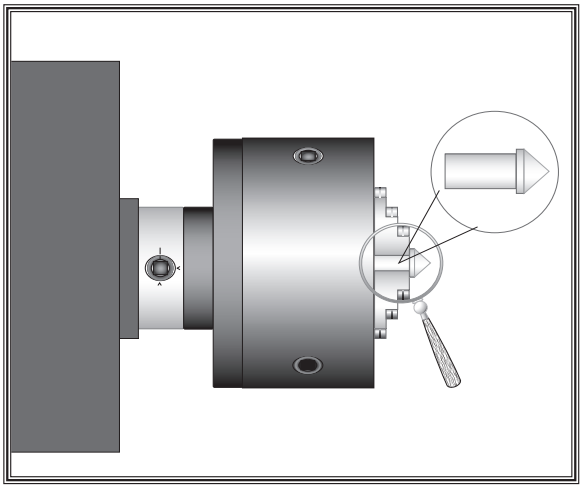


Figure 37. Tailstock centering dead center.

Note: *As long as the dead center remains in the chuck, the point of your center will remain true to the spindle axis. Keep in mind that the point will have to be refinished whenever it is removed and returned to the chuck. For more information refer to* ***Centers*** *on* ***Page 29*** *in this section.*

5. Place the live center in the tailstock.

6. Attach a lathe dog to the bar stock and mount it between centers (see **Figure 38**).

7. Turn approximately 0.010" off the diameter.

8. Measure the stock with a micrometer.

- If the stock is fat at the tailstock end, the tailstock needs to be moved toward the operator half the distance of the amount of the taper (see **Figure 39**).
- If the stock is thinner at the tailstock end, the tailstock needs to be moved away from the operator half the distance of the amount of the taper (see **Figure 40**).

9. Mount a dial indicator so the dial plunger is on the tailstock barrel before making adjustments to the tailstock.

10. Refer to **Cutting Shallow Tapers With The Tailstock** on **Page 27** for making adjustments to the tailstock center. Turn another 0.010" off of the diameter and check for a taper. Repeat this process as necessary until the desired amount of accuracy is achieved.

Figure 38. Checking tailstock alignment.

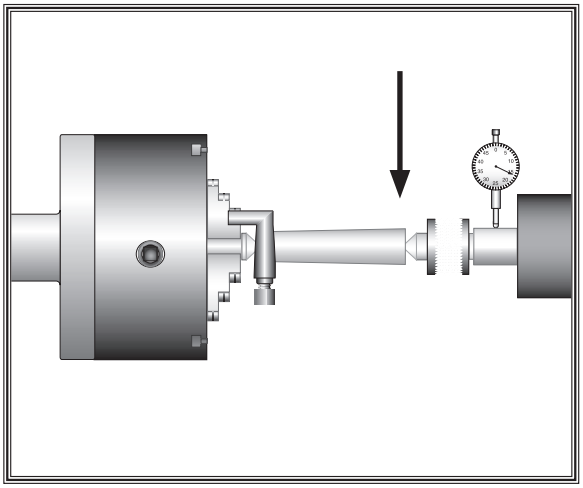


Figure 39. Tailstock adjustment option #1.

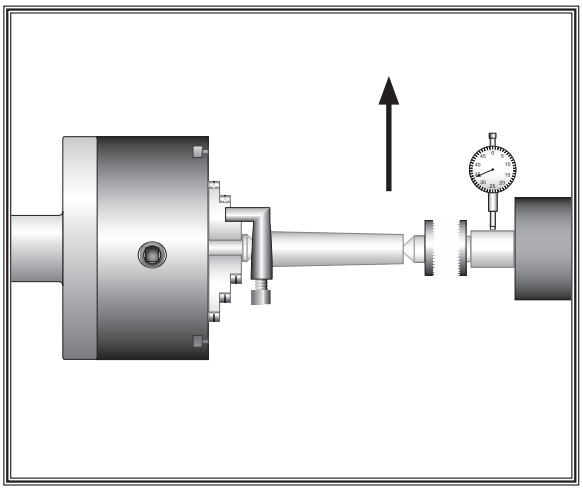


Figure 40. Tailstock adjustment option #2.

Centers

The dead center is used in the tailstock to support workpieces. When used in the tailstock, make sure to keep the dead center tip and workpiece lubricated.

The Model M1098 lathe is supplied with two MT#3 dead centers, one is HSS and one is carbide tipped. The supplied MT#5-#3 sleeve fits into the spindle taper to hold the MT#3 center.

To install a dead or live center, do these steps:

1. Feed the quill out about 1" so that the dead center can be inserted.
2. Insert the dead center into the quill opening. Matching tapers provide the locking action (see **Figure 41**).
3. Move the tailstock into position and lock in place.
4. Feed the quill into the workpiece.

   Note: *Make sure there is a center drilled hole in the end of the workpiece for the dead center.*
5. Lock the quill into place once the live center and the part rotate together. The quill may need to be adjusted during operation.
6. To remove the dead center, retract the quill until the dead center pops free.

The dead center can also be used in the spindle. The most common application is when using the faceplate (see **Figure 42**).

To install the dead center in the spindle, do these steps:

1. Remove the chuck from the spindle.
2. Install the dead center in the spindle sleeve.
3. Install the sleeve and center into the spindle opening.
4. Attach the faceplate to the spindle.

   Note: *When using the dead center in the spindle, use a lathe dog so that your part will rotate with the spindle and not spin on the dead center tip.*

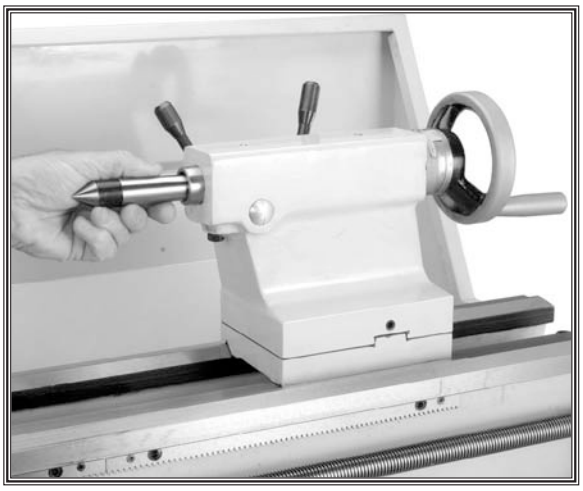


Figure 41. Inserting dead center.

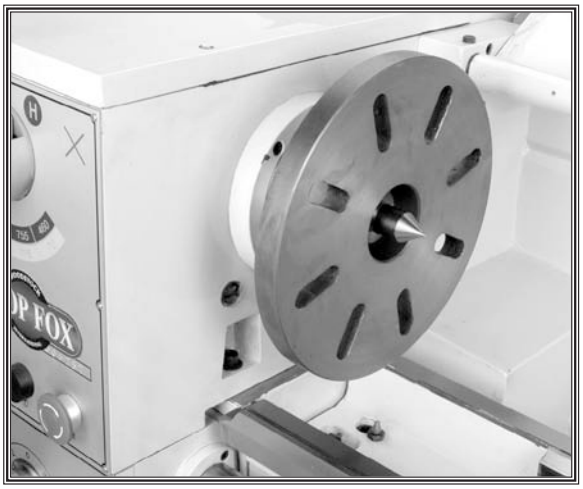


Figure 42. Faceplate and dead center setup.

NOTICE

Failure to keep dead center point well lubricated will damage dead center and workpiece.

Steady Rest

The steady rest serves as a support for long shafts (l/d ratio of 3:1 or greater). The steady rest can be placed anywhere along the length of the part.

To install/use the steady rest, do these steps:

1. Place the steady rest on the lathe bedways so the triangular notch fits over the angled portion of the rear bedway.

2. Loosen the three set screws so the finger position can be adjusted (see **Figure 43**).

3. Loosen the knurled knob (see **Figure 43**) and open the steady rest so a workpiece can fit inside of the fingers (see **Figure 44**).

4. Position the steady rest where desired. Tighten the bolt at the base of the steady rest to secure in place.

5. Close the steady rest so that the workpiece is inside the fingers and tighten the knob.

6. Set the fingers snug to the workpiece and secure by tightening the three set screws. Fingers should be snug and allow rotational movement of the workpiece. Lubricate the finger tips with an anti-seize grease during operation.

7. After prolonged use, the fingers will show wear. Either mill or file the tips for a new contact surface.

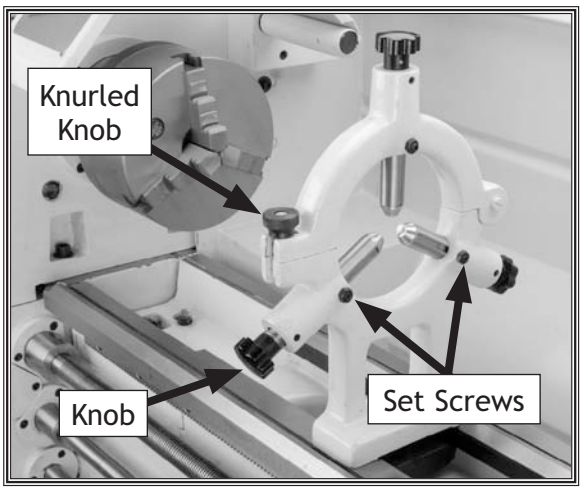


Figure 43. Steady rest adjustments.

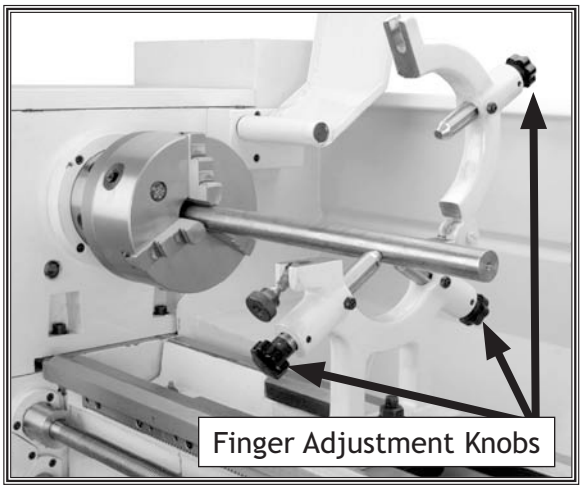


Figure 44. Positioning workpiece in steady rest.

Follow Rest

The follow rest in **Figure 45** is mounted on the saddle and follows the movement of the tool. It can be attached/removed by two socket head cap screws located at the base of the follow rest. The follow rest requires only two fingers, as the cutting tool acts as the third. The follow rest is used on long, slender parts to prevent flexing of the workpiece from the pressure of the cutting tool.

The sliding fingers are set similar to those of the steady rest—free of play but not binding. Always lubricate during operation. Remove the follow rest from the saddle when not in use. After prolonged use, the fingers will need to be milled or filed to cleanup the contact surface.

Figure 45. Follow rest attachment.

Setting Compound Slide

The compound slide is used to cut tapers on parts or to set the proper infeed angle when threading. It may also be used to cut specific lengths longitudinally, when set parallel to the spindle axis.

The compound slide handwheel has a graduated dial for precise inch feed increments. The base of the compound slide has a graduated scale for angular setup.

To set the angular position, do these steps:

1. Loosen the two cap screws, one on each side of the compound slide (see **Figure 46**).

2. Rotate the compound slide to the desired angular position. Use the scale at the base of the slide and the indicator marks on the carriage to set the position.

3. Tighten the two cap screws. Be sure to not overtighten, as you may strip threads.

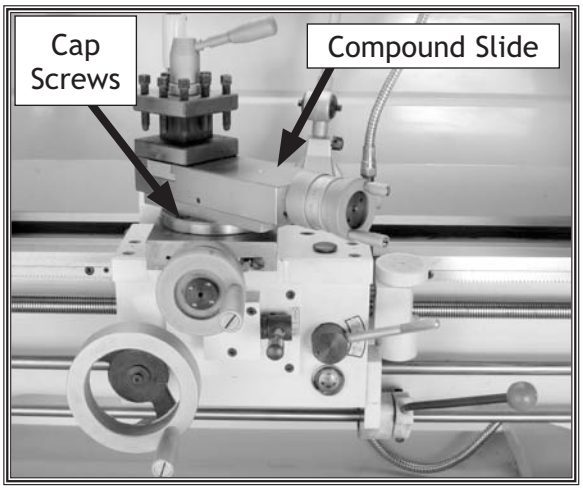


Figure 46. Compound slide set at an angle.

Four-Way Tool Post

The four-way tool post is mounted on top of the compound slide, and allows a maximum of four tools to be loaded simultaneously.

The four-way tool post allows for quick indexing to new tools. This is accomplished by rotating the top handle counterclockwise and then rotating the tool post to the desired position. Rotate the top handle clockwise to lock the tool into position.

To load the tool post, do these steps:

1. Choose the desired cutting tool.

2. Loosen the tool post bolts so that the cutting tool can fit underneath.

3. Use a minimum of two tool post bolts to hold down the cutting tool and tighten firmly (see **Figure 47**).

4. Repeat **Steps 1-3** for the three remaining openings, as needed.

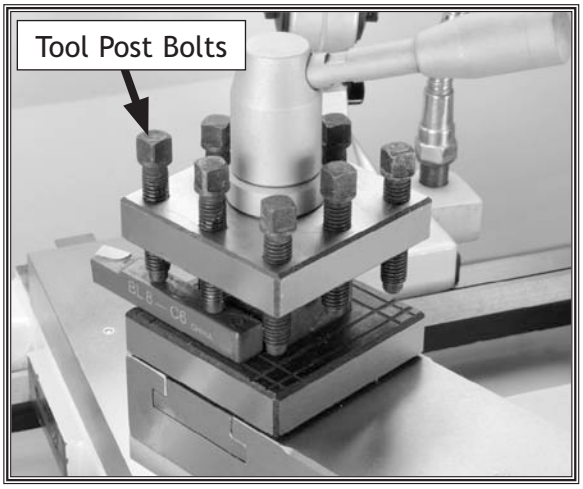


Figure 47. Tool holder and tool post.

NOTICE

Immediately remove tool post wrench after use. Tool post wrench could be picked up by chip and thrown.

Foot Brake

The Model M1098 lathe comes equipped with a foot brake (see **Figure 48).** The foot brake is intended to be used primarily as a time saving tool. The best method for using the foot break is turn the spindle ***OFF*** and then apply pressure to the foot brake with your foot, slowing the spindle to a stop.

Stepping on the foot brake while the spindle is ***ON*** will kill the power to the spindle control lever and will bring the spindle to a stop. Stopping the spindle in this manner is harder on the machine and should be reserved for emergency situations. Once stopped, the control lever will then need to be returned to the neutral position. The power light will show the power is still ***ON***. Only the circuit to the Spindle Rotation ON/OFF Lever will be interrupted.

Note: *Do not confuse this feature with the emergency stop button. The emergency stop button cuts power to the machine and must be reset to restore power to the lathe.*

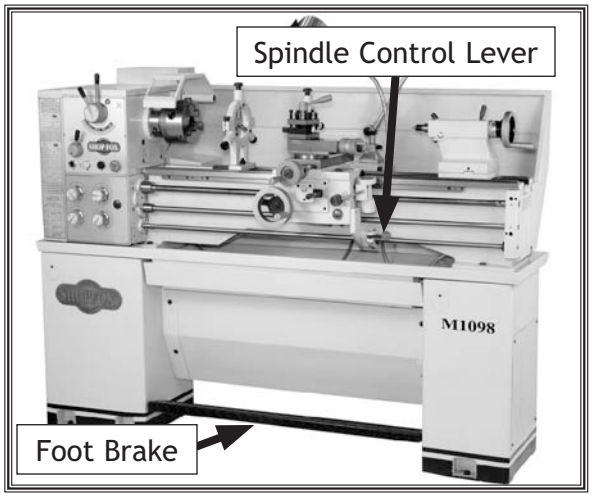


Figure 48. Foot brake and spindle control lever.

Manual Feed

You can manually move the cutting tool around the lathe with three methods. This section will review the individual controls on the carriage and provide descriptions of their uses (see **Figure 49**).

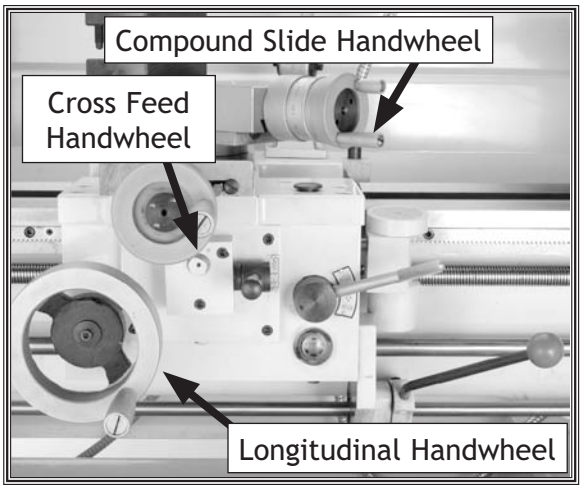


Figure 49. Carriage controls.

Longitudinal Handwheel

The longitudinal handwheel moves the carriage left or right along the bed. This control is helpful when setting up the machine for turning or when manual movement is desired during turning operations.

Cross Feed Handwheel

The cross slide handwheel moves the top slide toward and away from the work. Turning the dial clockwise moves the slide toward the workpiece. The graduated dial can be adjusted by holding the handwheel with one hand and turning the dial with the other.

Compound Slide Handwheel

The compound slide handwheel controls the position of the cutting tool relative to the workpiece. The compound slide is adjustable for any angle within its range. The graduated dial is adjustable using the same method as the dial on the cross slide. Angle adjustment is controlled by cap screws on the base of the compound slide.

Setting RPM

To determine and set the needed cutting RPM:

1. Use the table in **Figure 50** to determine the cutting speed required for the material of your workpiece.

⚠WARNING

Failure to follow RPM and feed rate guidelines may threaten operator safety from ejected parts or broken tools.

2. Determine the final diameter, in inches, for the cut you are about to take.

   Note: *For this step you will need to average out the diameters or work with the finish diameter for your calculations.*

3. Use the following formula to determine the needed RPM for your operation:

$$\frac{\text{(Cutting Speed x 4)}}{\text{(Diameter of Cut)}} = \text{RPM}$$

4. With the calculated RPM, decide on the closest cutting RPM to what you need.

5. Make sure the spindle is completely stopped before proceeding.

6. Move the levers to the RPM that is closest to your calculated RPM. The long lever (Range Lever) selects High or Low range, and the shorter lever (RPM Lever) selects the RPM in that range (**Figure 51**).

   Note: *You may need to rotate the spindle by hand to get the levers to properly engage.*

Cutting Speeds for High Speed Steel (HSS) Cutting Tools	
Workpiece Material	Cutting Speed (sfm)
Aluminum & alloys	300
Brass & Bronze	150
Copper	100
Cast Iron, soft	80
Cast Iron, hard	50
Mild Steel	90
Cast Steel	80
Alloy Steel, hard	40
Tool Steel	50
Stainless Steel	60
Titanium	50
Plastics	300-800
Wood	300-500

Note: *For carbide cutting tools, double the cutting speed. These values are a guideline only.*
Refer to the *MACHINERY'S HANDBOOK* for more detailed information.

Figure 50. Cutting speed table for HSS cutting tools.

Figure 51. Spindle speed selector levers.

Spindle Break-In

It is essential to closely follow the proper break-in procedure to ensure correct bearing and gear tooth seating and mating. Complete this process once you have familiarized yourself with all instructions in this manual.

To begin the break-in procedure, do these steps:

1. Check oil levels in headstock and apron. Correct oil levels if required. Refer to **Lubrication** in the **MAINTENANCE** section on **Page 39** of this manual.

2. Make sure there are no obstructions around or underneath the spindle.

4. Set the spindle speed to 190 RPM, refer to section **Setting RPM** on **Page 33.**

5. Turn the lathe power ***ON***, and move the **Spindle Rotation ON/OFF Lever** (**Figure 52**) to either the FORWARD or REVERSE position, and verify that the spindle rotates in the proper direction.

6. Let the lathe run for a minimum of 10 minutes.

7. Turn the lathe ***OFF***, change gears to the next highest RPM and repeat this step for each RPM setting in Low and High Range.

8. Change the headstock lubricant, refer to **Page 39**.

Setting Power Feed Rate

The carriage has longitudinal and cross slide power feed capabilities. **Note:** *These instructions are valid with a counterclockwise rotation of the spindle "looking at the chuck." All directions reverse when spindle rotation is reversed.*

To set and engage the power feed, do these steps:

1. From your cutting and feed rate calculations, select the feed rate that you need from the chart (see **Figure 53**).

2. Install the 40 tooth change gear at location **a** shown on the chart.

3. Turn the feed dials to the setting indicated on the chart. **Note:** *You may need to rotate the chuck by hand or move the longitudinal handwheel to get selectors and gears to engage.*

NOTICE

Failure to follow start up and spindle break-in procedures will cause rapid deterioration of spindle drive system.

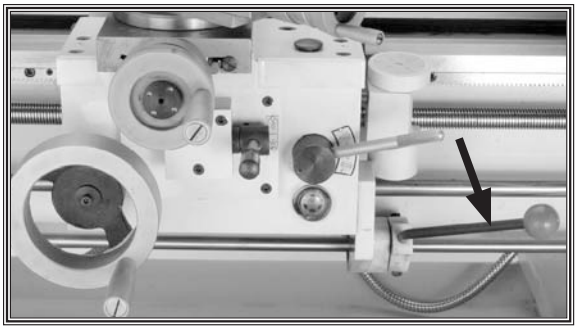


Figure 52. Spindle Rotation ON/OFF Lever.

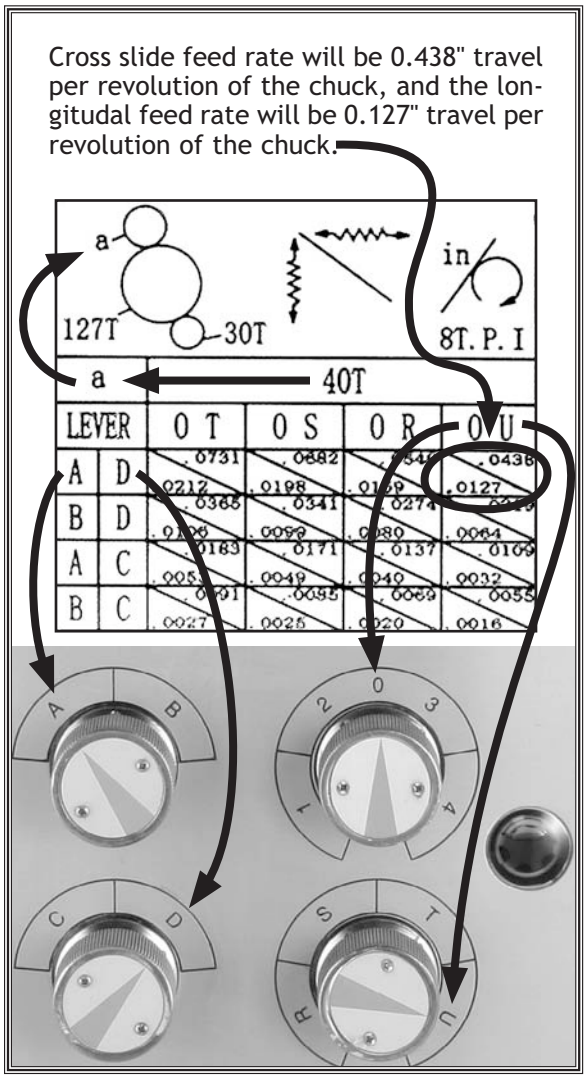


Figure 53. Selecting power feed rate.

4. Make sure the half nut lever shown in **Figure 54** is disengaged.

5. Use the feed selector lever shown in **Figure 55** to engage the cross feed or longitudal feed when needed.

6. Use the **Spindle Rotation ON/OFF Lever** (**Figure 55**) to start the lathe and the power feed operation when needed.

NOTICE

Feed rate is based on spindle RPM. High feed rates combined with high spindle speeds result in a rapidly moving carriage or cross slide. Pay close attention to the feed rate you have chosen and be ready to push the foot brake. Failure to fully understand this will cause the carriage to crash into the spindle.

NOTICE

Make sure all power feed settings are disengaged before starting the lathe! Thoroughly familiarize yourself with all the controls and their functions before using power feed!

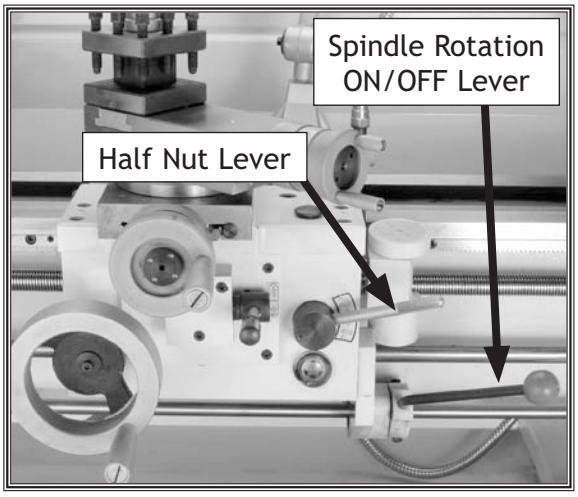


Figure 54. Disengaging half nut lever.

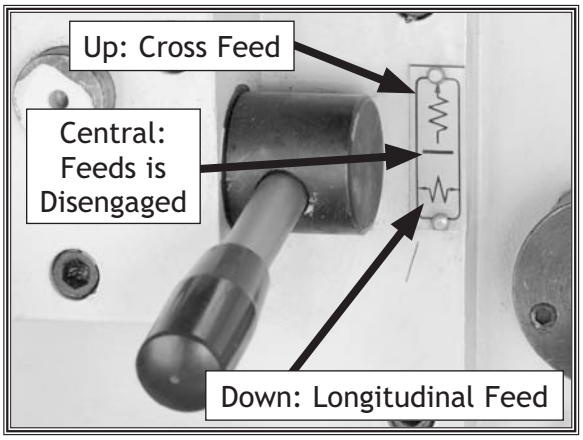


Figure 55. Feed selector lever.

Thread Settings

The Model M1098 lathe is capable of cutting inch and metric threads. Most inch threads can be cut without changing out gears. Metric threads and a few inch threads require that you change the gears.

To determine thread settings, do these steps:

1. Calculate your required cutting speed, and move the spindle RPM levers so it will run at the closest RPM.

2. Determine the threads per inch (TPI) for inch threads or pitch for metric threads.

3. Install the **40** tooth gear at position **a**, and the **30** tooth gear at position **b** as shown on the chart (see **Figure 56**).

4. Turn the feed dials to the setting indicated on the chart (see **Figure 56**).

   Note: *You may need to rotate the chuck by hand or move the longitudinal handwheel to get selectors and gears to engage.*

5. Move the feed selector lever to the central position shown in **Figure 57** to disengage the cross feed or longitudal feed.

6. Use the **Spindle Rotation ON/OFF Lever** to start the lathe when needed.

7. Use the half nut lever to engage and disengage the apron for threading operations.

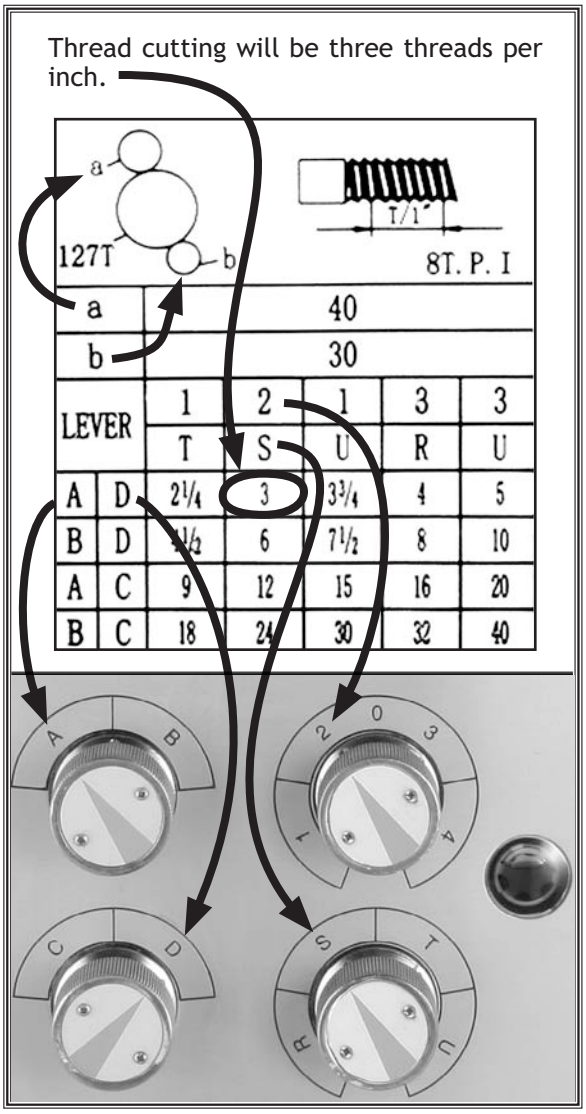


Figure 56. Feed and thread chart in TPI and metric pitch.

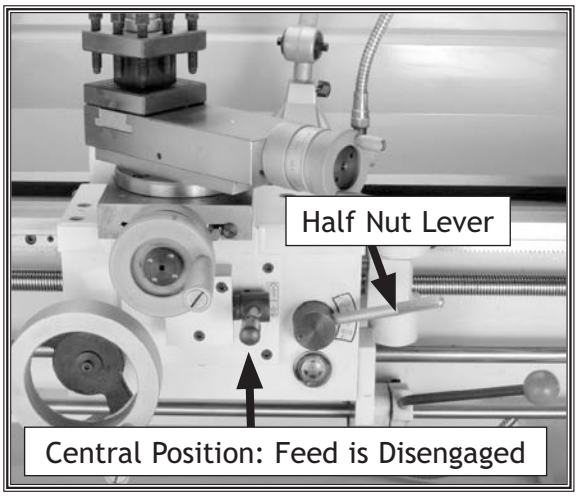


Figure 57. Apron control levers.

Change Gears

The Model M1098 lathe comes with 40, 127, 120, and 30 tooth gears installed. One extra 40 tooth gear is included so gear ratios can be altered for threading operations. The charts on the machine indicate which ratios are applicable for an intended operation.

To change the gears, do these steps:

1. DISCONNECT POWER TO THE LATHE!

2. Remove two thumb knobs and remove the headstock gear cover to expose the change gears (**Figure 58**).

3. Loosen the gear adjuster (**Figure 59**), and let the gear swing down.

4. Remove the appropriate change gear according to your the chart, and install the required gear (see **Figure 59**).

5. Mesh the gear teeth, and tighten the gear adjuster back in place so there is a slight amount of gear-tooth backlash, approximately from 0.002" to 0.005".

   Note: *Setting the gears too tight will cause excessive wear and noise. Setting the gears too loose may cause slippage and possibly break gear teeth.*

6. Oil the gears, reinstall the gear cover, and reconnect power to the machine.

Figure 58. Gear cover.

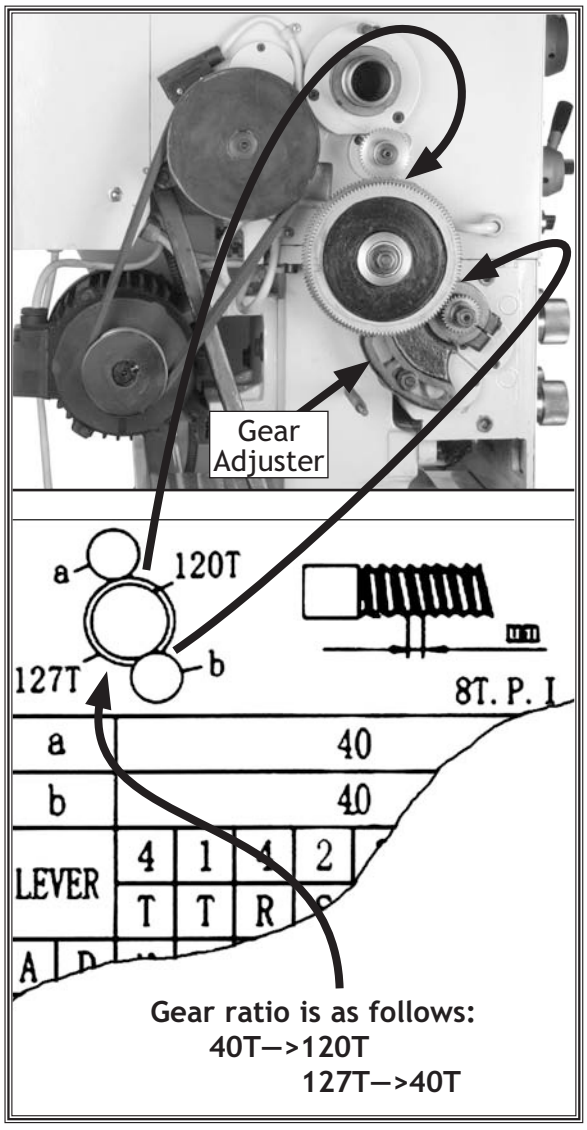


Figure 59. Change gear locations.

Threading Operation

1. Set the compound rest to the appropriate angle for the given thread you want to cut. For a Unified National Series thread, this is 29° off of perpendicular to the spindle axis.

2. Set the tool tip perpendicular to the workpiece and center it vertically.

3. Make sure the thread dial is engaged with the lead screw. If not, use a hex wrench to loosen the screw and rotate the thread dial until the gear engages with the lead screw, then tighten the screw to hold the dial in place.

4. Select the RPM you want to use. A slower RPM will give you more time to react especially if threading over a short distance or threading up to a shoulder.

5. Set the feed direction lever for either right or left-handed threads.

6. With the feed rate selectors to the appropriate settings, turn ***ON*** the spindle to verify settings. Check to see that the lead screw is turning and verify that the apron moves in the correct direction by engaging the half nut lever shown in **Figure 60**.

7. Once you are confident the settings are correct, disengage the half nut and turn ***OFF*** the spindle.

8. Examine the indicator table on the machine or in **Figure 61** to determine which numbers (on the thread dial) will engage the half nut.

   Note: *There are a total of eight marks on the thread dial, including the numbers 1-4. Any mark can be used to cut even numbered threads. Use the numbered lines, 1, 2, 3, or 4 to cut odd numbered threads. To maintain accuracy and consistency, engage the half nut on the same mark on each pass. Failure to start on the same number each time may lead to cutting off the thread made in the previous pass.*

9. If cutting metric threads, you will not use the thread dial. Once the half nut is engaged, you must leave it engaged until the threads are complete.

NOTICE

Failure to follow RPM and feed rate guidelines in this manual will put undue strain on moving parts, shorten tool life, and create poor workpiece results.

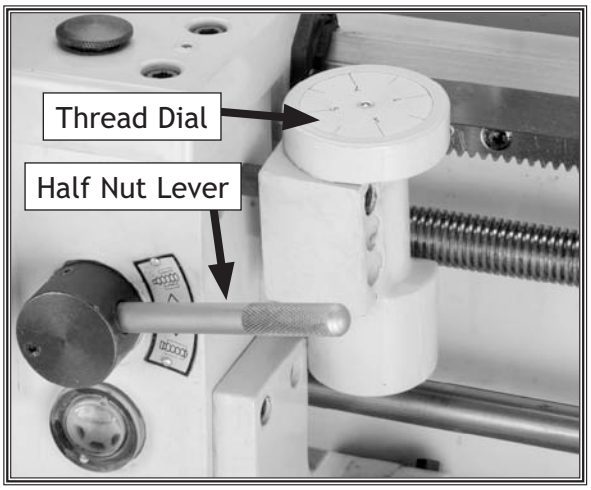


Figure 60. Half nut and thread dial location.

INDICATOR TABLE

1/inch	2¼	3	3¾	4	4½
SCALE	1	1*3*5*7	1	1 - 8	1*5
1/inch	5	6	7½	8	9
SCALE	1*3*5*7	1 - 8	1*5		1*3*5*7
1/inch	10	12	15	16	18
SCALE	1 - 8	1 - 8	1*3*5*7		1 - 8
1/inch	20	24	30	32	40
SCALE	1 - 8		1 - 8		

Figure 61. Thread dial chart.

OPERATIONS

MAINTENANCE

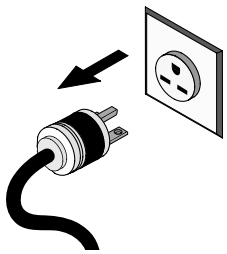
General

Regular periodic maintenance on your **SHOP FOX®** Model M1098 will ensure its optimum performance. Make a habit of inspecting your machine each time you use it.

Check for the following conditions and repair or replace when necessary:

- Loose mounting bolts.
- Worn switch or safety features.
- Worn or damaged cords and plugs.
- Damaged V-belt.
- Any other condition that could hamper the safe operation of this machine.

WARNING



MAKE SURE that your machine is unplugged during all maintenance procedures! If this warning is ignored, serious personal injury may occur.

Cleaning

Make sure to unplug the lathe before cleaning it. Clean your machine every day or more often as needed. Remove chips as they accumulate. Chips left on the machine soaked with water based coolant will eventually invite oxidation and gummy residue to build up around moving parts. Cleaning will help keep your lathe running smoothly. Always be safe and responsible with the use and disposal of cleaning products.

Lubrication

The headstock, gear box and apron can use any quality ISO 32 hydraulic oil. Keep the oil levels at 3/4-full as seen in the sight glasses (see **Figures 62**, **63,** and **64**). After break-in, change the oil in the headstock after three months. After that change the all oils at the same time on an annual basis or more frequently if extreme machine use requires it.

Figure 62. Oil sights and filler locations.

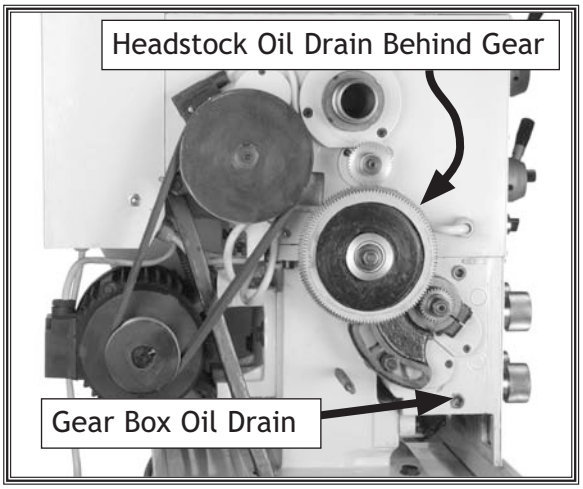


Figure 63. Headstock and gear box drain locations.

For daily lubrication, use the manual oil gun with the same gear box lubricant to lubricate all oil fittings. To control surface rust on machined surfaces, wipe the unprotected metal as required with this same oil.

To lubricate the lathe, do these steps:

1. Wipe off the oil port before and after oiling to keep out contaminants.

2. Oil all ball fittings daily with one to two shots of oil. See **Figure 65** for some typical locations.

   These areas include:
   • Cross Slide, Compound Rest, and Carriage
   • Tailstock, Lead Screw, and Feed Rod
   • Handwheels, Ways, Change Gear Teeth, and Axles

Coolant System

To maintain the coolant system, do these steps:

1. Remove the four screws and pump access cover, and slide out the pump and reservoir (see **Figure 66**).

2. Empty the old coolant and remove large chips from 1st and 2nd stage separators.

3. Fill the reservoir with approximately three gallons of coolant solution.

4. Open the valve on the coolant nozzle.

5. Turn the coolant pump ***ON*** to prime the coolant system and to see if the coolant is cycling properly.

6. Reinstall the pump access cover.

⚠WARNING

BIOLOGICAL and POISON HAZARD!

The reservoir on this machine is designed to store coolant. During storage some fluids grow dangerous microbes, or collect toxic heavy metals in the fluid making it a biological and poison hazard.
• To prevent infections and poisoning, use the correct personal protection equipment when handling coolant.
• To properly dispose of toxic coolant, follow federal, state, and fluid manufacturer procedures.

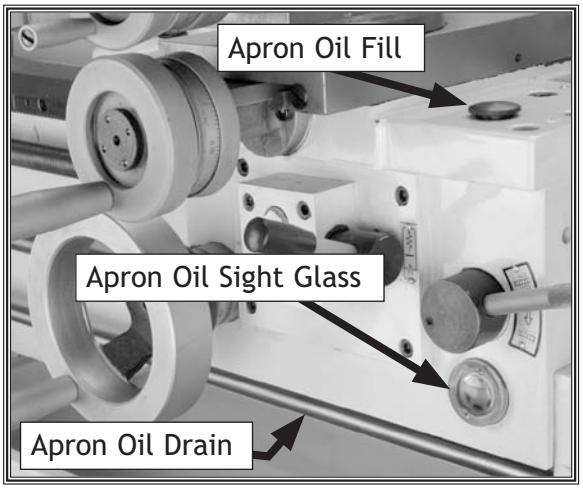


Figure 64. Apron lubrication references.

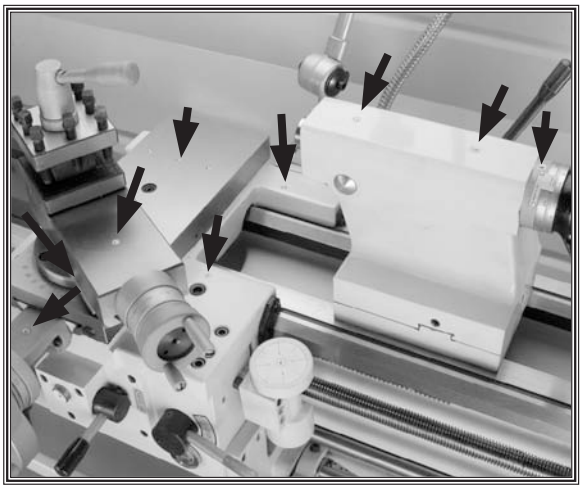


Figure 65. Typical ball fitting locations.

Figure 66. Coolant pump and reservoir.

NOTICE

Failure to follow lubrication guidelines will lead to rapid deterioration of lathe components.

SERVICE

General

This section covers the most common service adjustments or procedures that may need to be made during the life of your machine.

Cross Feed Backlash

Backlash is the amount of play found in a lead screw. It can be found by turning the cross slide handwheel in one direction, and then turning the handwheel the other direction. When the cross slide begins to move, the backlash has been taken up.

To remove excessive backlash, do these steps:

1. Tighten the socket head cap screw in small increments (see **Figure 67**).

2. Test after each adjustment until the backlash meets the needs of the operator and operation.

   Note: *Avoid the temptation to overtighten the socket head cap screw. Overtightening will cause excessive wear to the sliding block and lead screw.*

Gibs

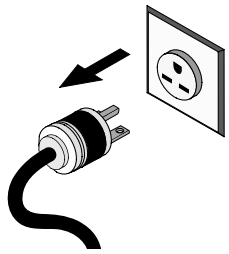
The saddle, cross feed, compound rest, and tailstock gibs can all be adjusted on the Model M1098 lathe.

Note: *When adjusting gibs, keep in mind that the goal of gib adjustment is to remove sloppiness without causing the slides to bind. Loose gibs may cause poor finishes on the workpiece and may cause undue wear on the slide. Over-tightening may cause premature wear on the slide, lead screw, and nut.*

To adjust the saddle gib, do these steps:

1. Loosen four hex nuts found at the bottom rear of the cross slide and back off one full turn each (see **Figure 68**).

⚠WARNING



MAKE SURE that your machine is unplugged during all service procedures! If this warning is ignored, serious personal injury may occur.

Figure 67. Cross feed backlash adjustment socket head cap screw.

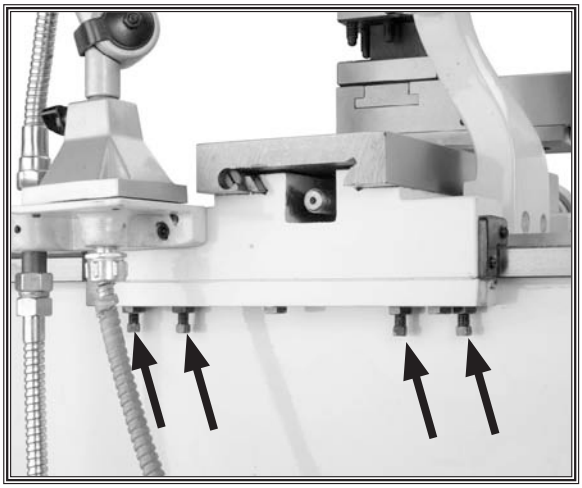


Figure 68. Saddle gib adjustments.

2. Turn the four square head bolts with a hex wrench until a slight resistance is felt when moving the saddle. DO NOT overtighten.

3. Move the carriage with the handwheel to feel the current drag. Adjust the bolts until the desired drag is achieved.

   Note: *Overtightening will cause excessive premature wear on the gibs or crack the housing.*

4. Tighten the four hex nuts.

To adjust the cross feed and compound rest gibs, do these steps:

1. Loosen the gib locking set screw and the rear gib screw approximately one turn. (see **Figure 69**).

2. Tighten the front gib screw a quarter turn (see **Figure 70**).

3. Turn the cross feed handwheel to feel the current drag and adjust the front screw until the desired drag is achieved.

4. When satisfied with the adjustment, snug the gib locking set screw.

5. Repeat **Steps 1-4** on the compound rest.

To adjust the tailstock lock, do these steps:

1. Move the tailstock lock handle to the unlocked position.

2. Slide the tailstock to an area that will allow access to the hex nut under the tailstock block.

3. Tighten the tailstock hex nut 1/4 turn. Test to see that sufficient clamping pressure is applied so the tailstock will not move. Repeat as necessary (see **Figure 71**).

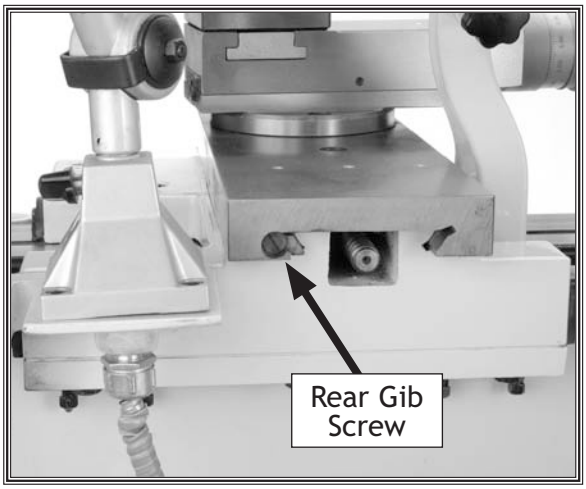


Figure 69. Rear cross feed gib screw.

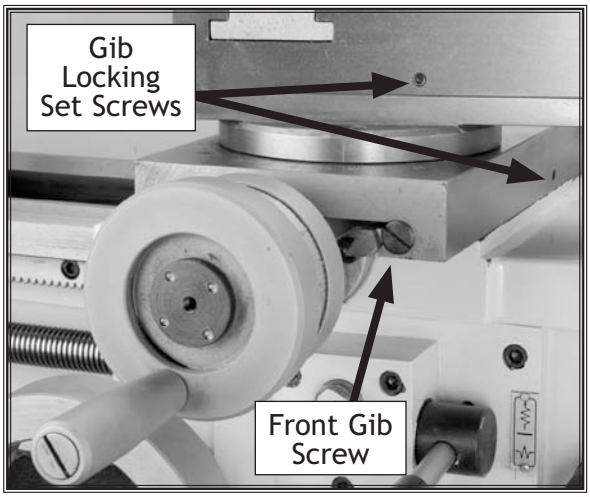


Figure 70. Front cross feed gib screw.

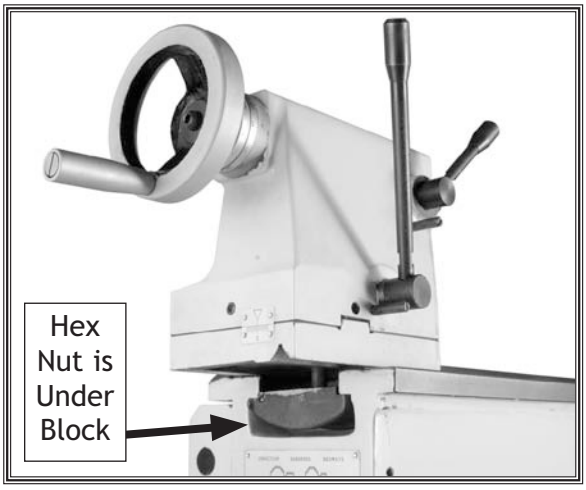


Figure 71. Tailstock lock adjustment.

SERVICE

Replacing V-Belt

To replace the V-belts on the lathe, do these steps:

1. DISCONNECT POWER TO THE LATHE!
2. Remove the change gear cover at from the headstock.
3. Remove the tension off the old V-belts by loosening the motor mount hex bolts (see **Figure 72**).
4. Remove the old belts and install the new ones. Always replace these belts in pairs.
5. Tighten the motor mount bolts until you achieve 1/4" of belt deflection when lightly pushed with your finger tips.
6. Close the change gear cover, and reconnect the lathe to the power source.

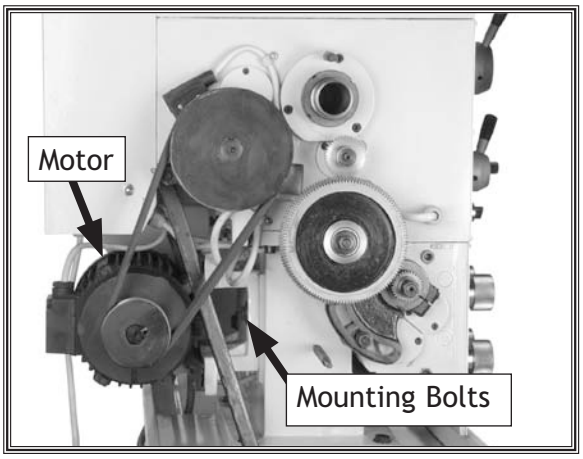


Figure 72. V-belt adjustments.

Main Electrical Box

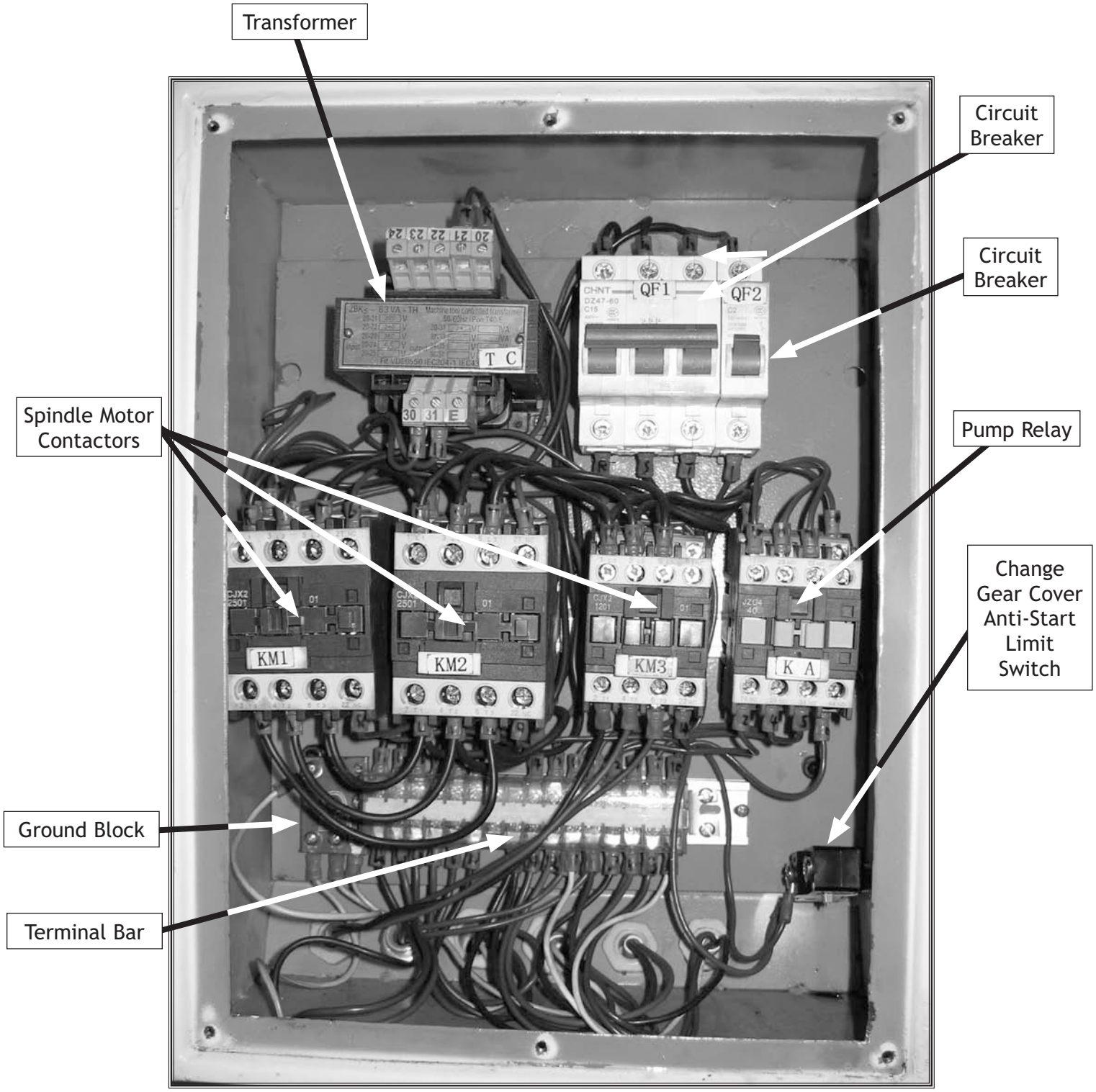
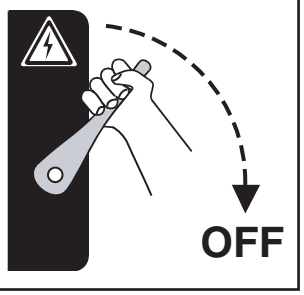


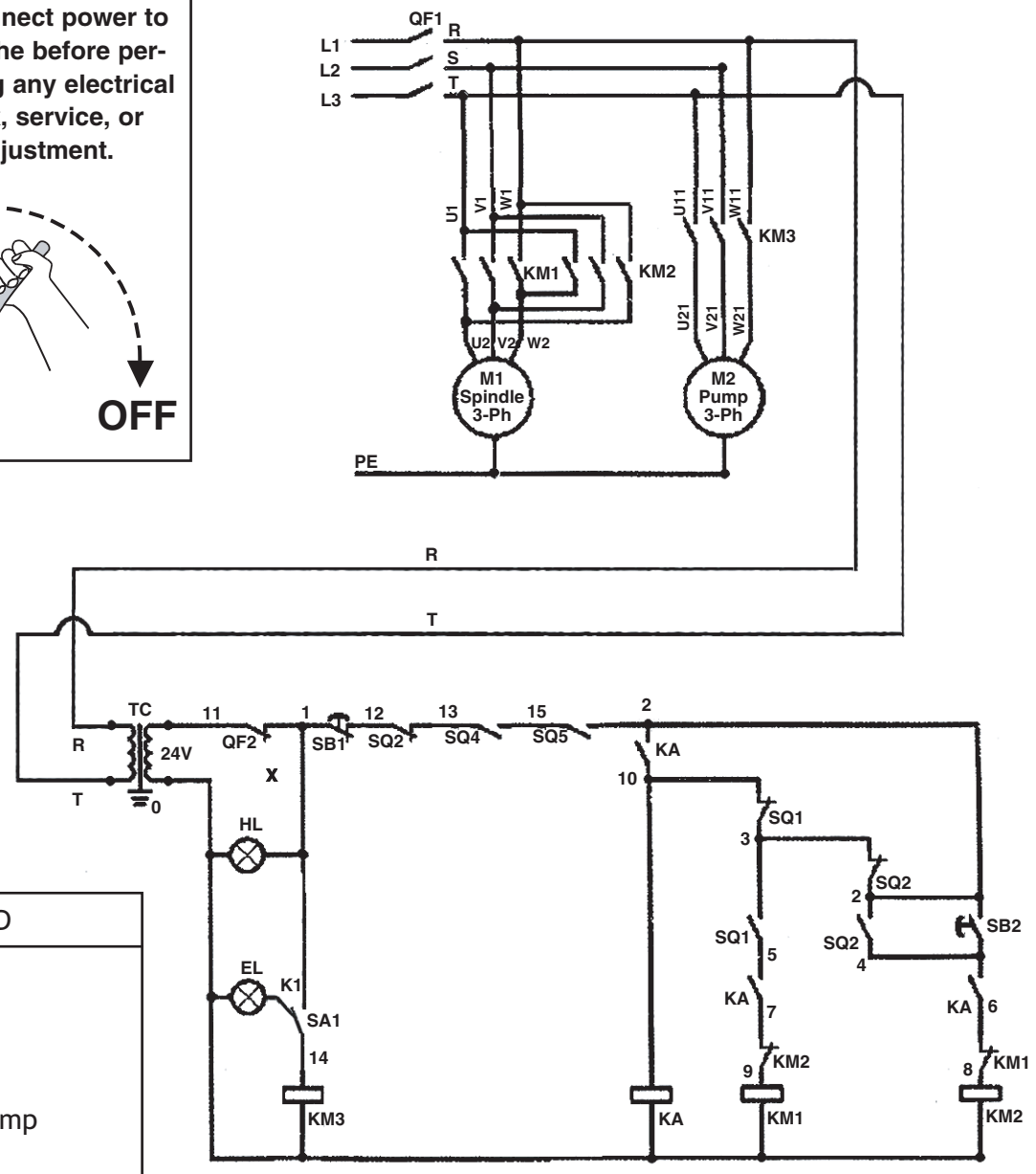
Figure 73. M1098 Electrical panel.

Wiring Diagram (M1098 220V 3-Phase)

WARNING

Disconnect power to the lathe before performing any electrical work, service, or adjustment.



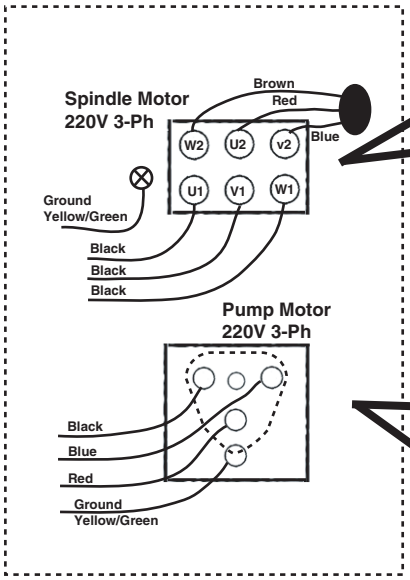


LEGEND
M = Motor
KM = Contactor
KA = Relay
EL = Work Lamp
HL = Indicator Lamp
SB = Button
SA = Button
SQ = Limit Switch
TC = Transformer
QF = Circuit Breaker
FR = Relay

SERVICE

Motor Connections (M1098 220V 3-Phase)

Figure 74. M1098 chuck guard limit switch.



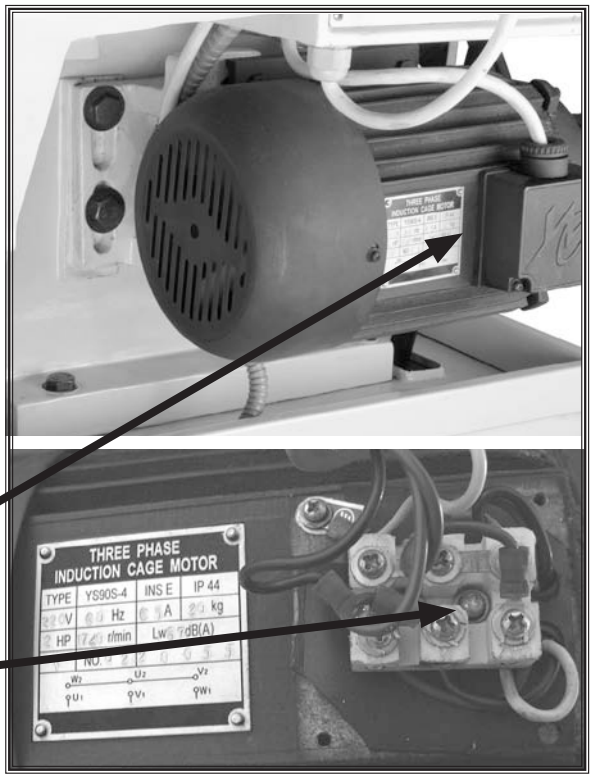


Figure 76. M1098 spindle motor.

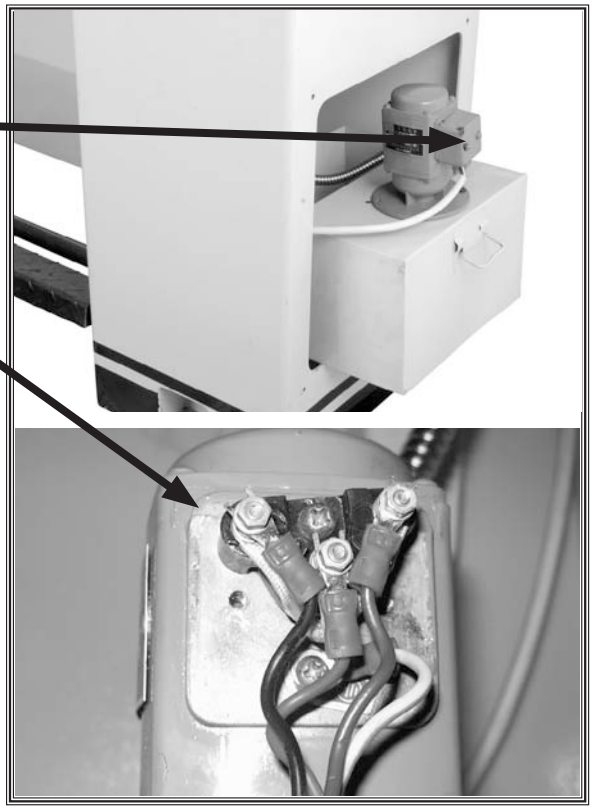


Figure 77. M1098 coolant pump motor.

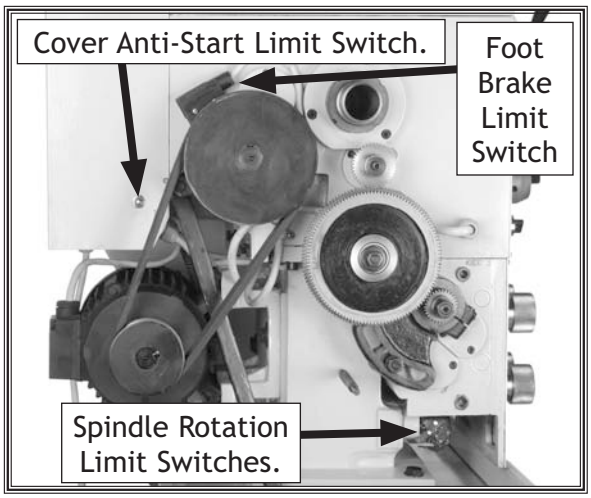


Figure 75. M1098 limit switches.

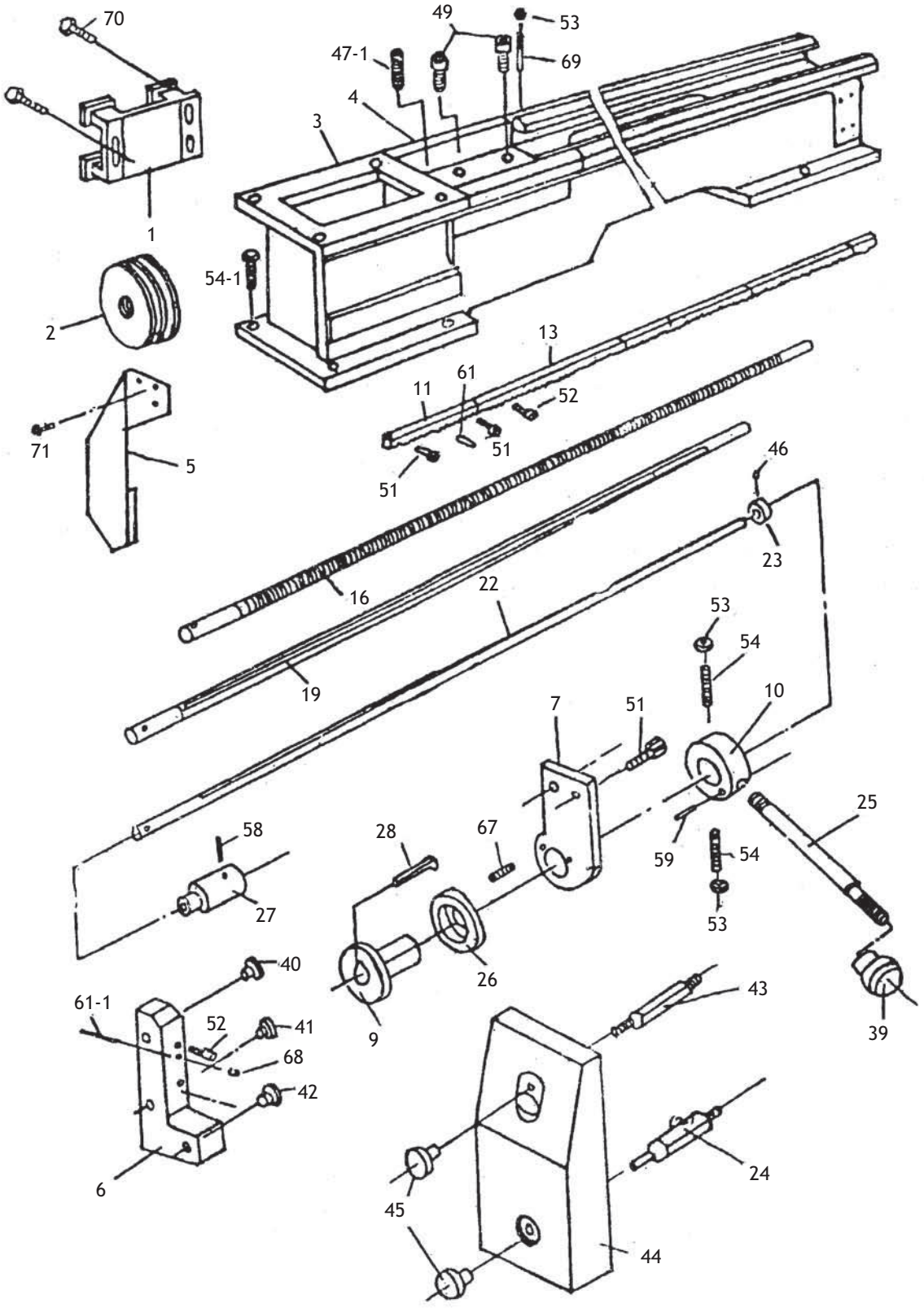
SERVICE

Troubleshooting

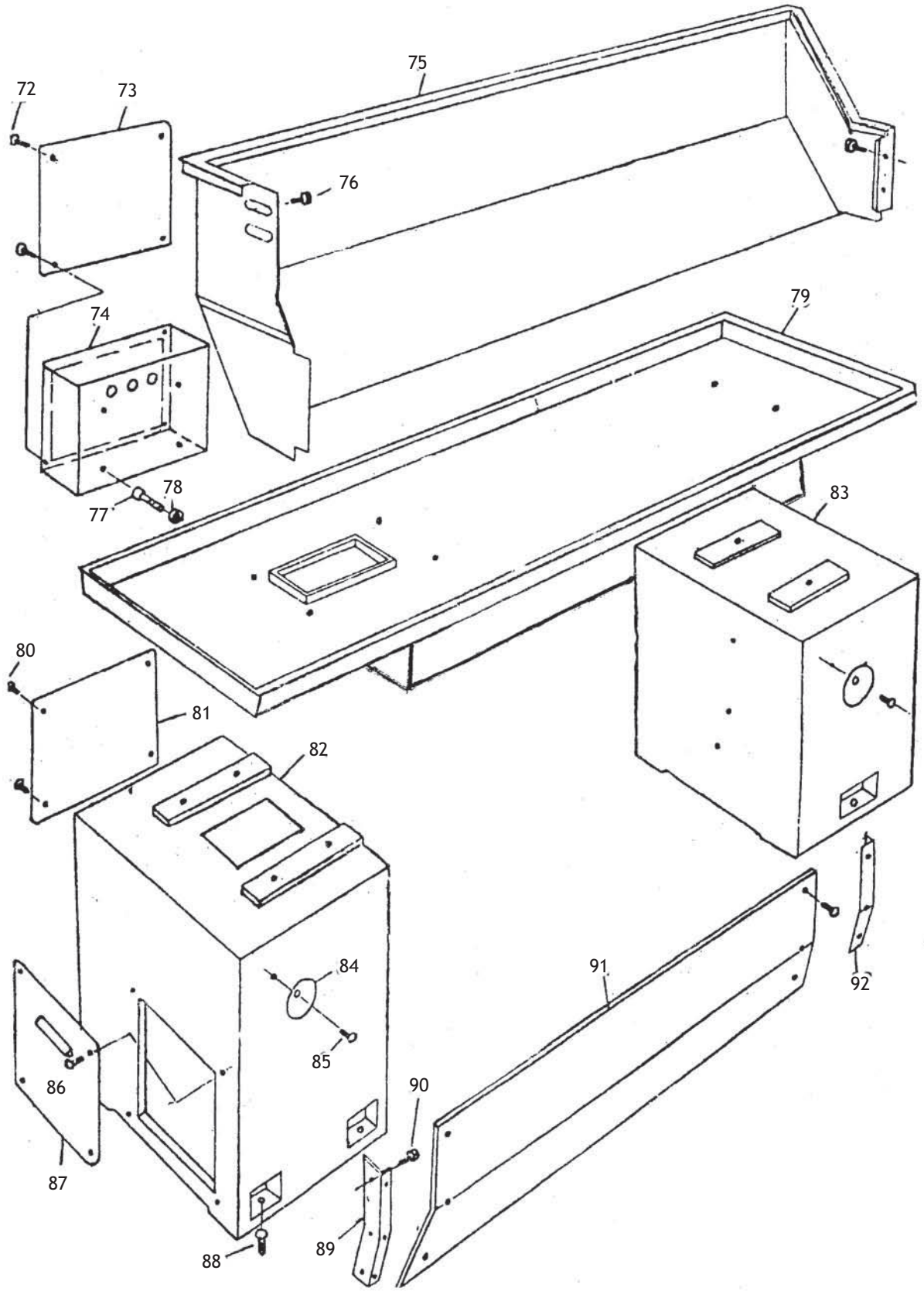
This section covers the most common Gear Head Lathe problems. DO NOT make any adjustments until the Gear Head Lathe is unplugged and moving parts have come to a complete stop.

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Motor will not start.	1. Limit switch is triggered. 2. Emergency switch is pushed in. 3. No voltage or open connection. 4. Faulty start capacitor.	1. Install headstock cover, close chuck guard. 2. Rotate emergency switch so it pops out. 3. Test for voltage, close circuit breakers, replace fuses, test magnetic switches—replace as required. 4. Replace start capacitor.
Fuses or circuit breakers trip open.	1. Short circuit in line cord or plug. 2. Short circuit in motor or loose connections. 3. Incorrect fuses or circuit breakers in power supply.	1. Inspect cord or plug for damaged insulation and shorted wires and replace extension cord. 2. Inspect all connections on motor for loose or shorted terminals or worn insulation. 3. Install correct fuses or circuit breakers.
Motor overheats.	1. Motor overloaded. 2. Air circulation through the motor restricted.	1. Reduce load on motor. 2. Clean out motor to provide normal air circulation.
Carriage hard to move.	1. Carriage lock is tightened down. 2. Chips have loaded up on bedways. 3. Bedways are dry and in need of lubrication. 4. Longitudinal stops are interfering. 5. Gibs are too tight.	1. Check to make sure table locks are fully released. 2. Frequently clean away chips that load up during turning operations. 3. Lubricate bedways and handles. 4. Check to make sure that stops are floating and not hitting the center stop. 5. Loosen gib screw(s) slightly.
Loud, repetitious noise coming from machine.	1. Chuck is hitting the carriage or tool post.	1. Shut lathe *OFF!* Hit emergency stop button or step on foot pedal.
Machine is loud when cutting. Overheats or bogs down in the cut.	1. Excessive depth of cut. 2. RPM or Feed Rate wrong for operation. 3. Dull cutters.	1. Decrease depth of cut. 2. Refer to RPM Feed rate chart for appropriate rates. 3. Sharpen or replace cutters.
Tailstock quill will not feed out of tailstock.	1. Quill lock is tightened down.	1. Unlock.
Bad surface finish.	1. Wrong RPM or feed rate. 2. Dull tooling or poor tool selection. 3. Too much play in gibs.	1. Adjust for appropriate RPM and feed rate. 2. Sharpen tooling or select a better tool for the intended operation. 3. Tighten gibs.
Gear change levers will not shift into position.	1. Gears not aligned in headstock.	1. Rotate spindle by hand until gear falls into place.
Can't remove tapered tool from quill.	1. Quill had not retracted all the way back into the tailstock. 2. Debris was not removed from taper before inserting into quill.	1. Turn the quill handwheel until it forces taper out of quill. 2. Always make sure that taper surfaces are clean.

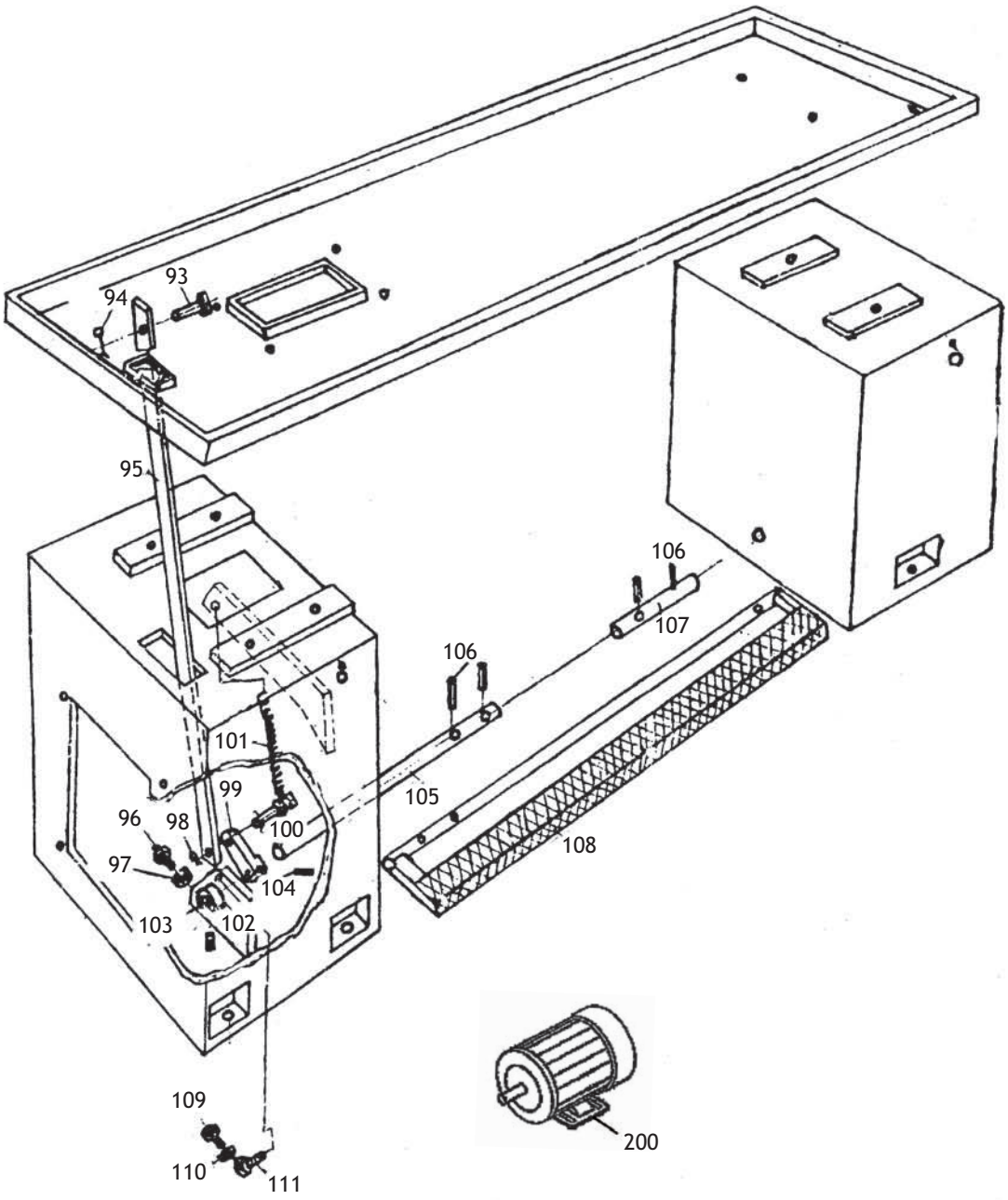
Bed, Lead Screw, and Feed Rod Diagram
(0000 Series Parts)



Backsplash, Chip Tray, and Stand Diagram
(0000 Series Parts)



Emergency Brake Diagram
(0000 Series Parts)

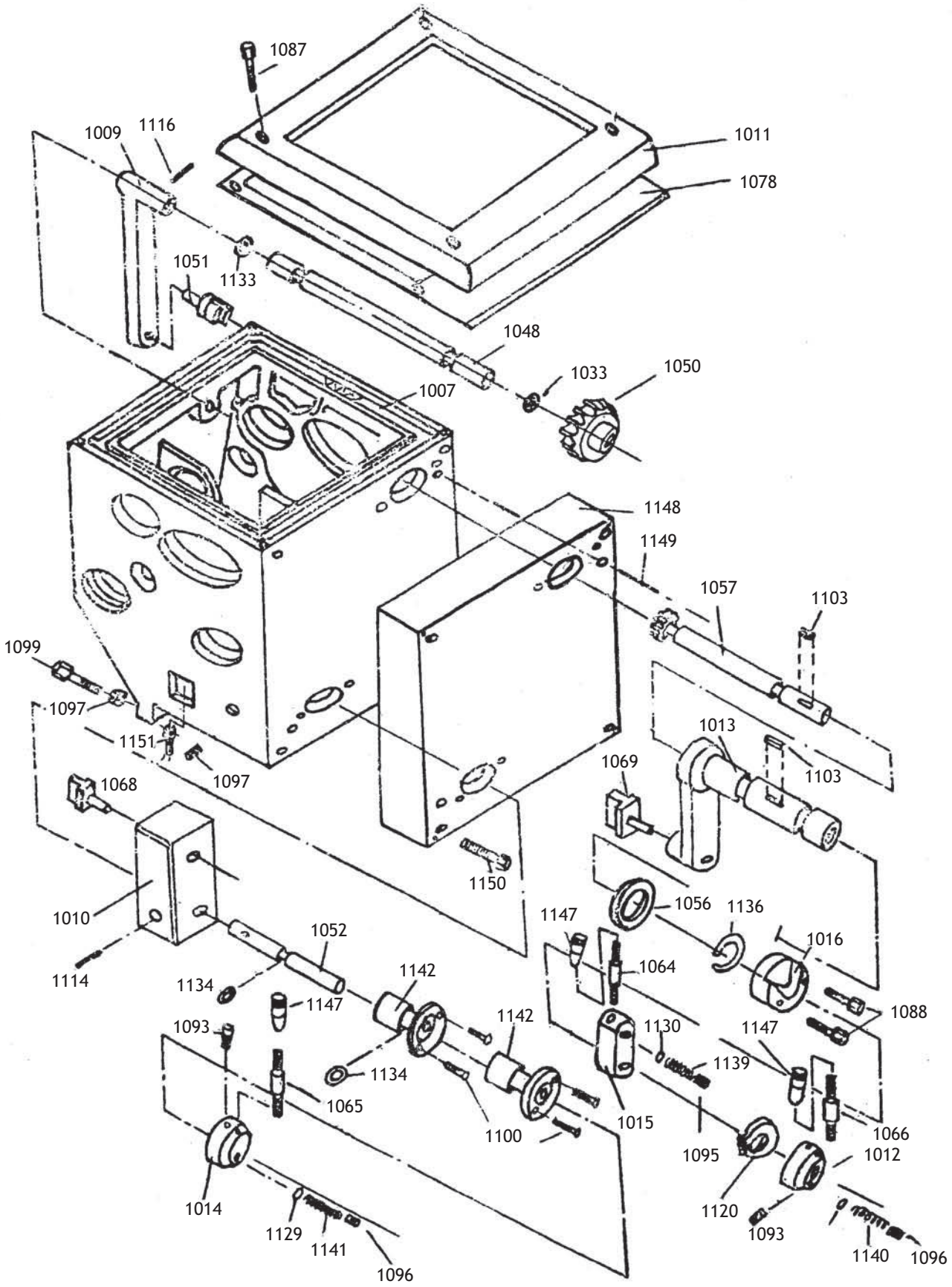


0000 Series Parts List

REF	PART #	DESCRIPTION
1	XM10980001	MOTOR BASE
2	XM10980002	PULLEY
3	XM10980003	BED
4	XM10980004	GAP
5	XM10980005	END COVER
6	XM10980006	L-BRACKET
7	XM10980007	COLLAR-BRACKET
9	XM10980009	COLLAR
10	XM10980010	HANDLE
11	XM10980011	RACK (LONG)
13	XM10980013	RACK (SHORT)
16	XM10980016	LEAD SCREW
19	XM10980019	FEED ROD
22	XM10980022	SHAFT
23	XM10980023	COLLAR
24	XM10980024	SHAFT
25	XM10980025	HANDLE
26	XM10980026	BRAKE RING
27	XM10980027	COLLAR
28	XM10980028	KEY
39	XM10980039	KNOB M8-1.25
40	XM10980040	PLUG
41	XM10980041	PLUG
42	XM10980042	PLUG
43	XM10980043	SPECIAL SCREW
44	XM10980044	COVER
45	XM10980045	KNOB M8-1.25
46	XPSS05M	SET SCREW M5-.8 X 10
47-1	XPSS11M	SET SCREW M6-1 X 16
49	XPSB47M	CAP SCREW M10-1.5 X 40
51	XPSB02M	CAP SCREW M6-1 X 20
52	XPSB60M	CAP SCREW M8-1.25 X 55
53	XPN03M	HEX NUT M8-1.25
54	XPSS19M	SET SCREW M8-1.25 X 30
54-1	XPSB63M	CAP SCREW M12-1.75 X 60
58	XPRP16M	ROLL PIN 3 X 25
59	XPRP71M	ROLL PIN 6 X 22
61	XPRP46M	ROLL PIN 6 X 28
61-1	XPRP34M	ROLL PIN 6 X 55
67	M10980067	COMPRESSION SPRING 1 X 7.5 X 25
68	M1098068	OIL BALL 8MM
69	XM10980069	SET SCREW M8-1.25 X 60
70	XPB14M	HEX BOLT M10-1.5 X 35

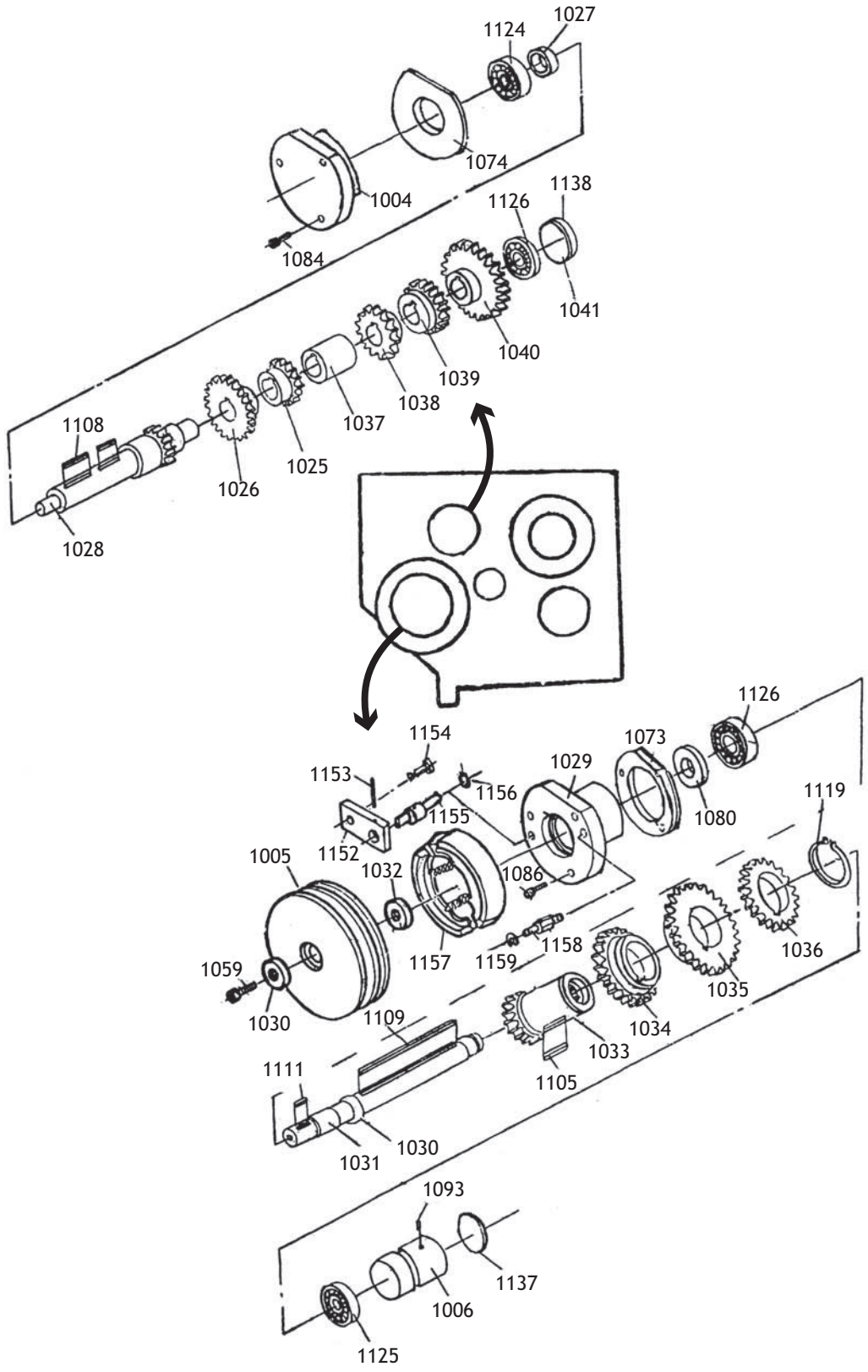
REF	PART #	DESCRIPTION
71	XPS03M	PHLP HD SCR M6-1 X 8
72	XPS19M	PHLP HD SCR M5-.8 X 6
73	M10980073	COVER
74	M10980074	ELECTRICAL BOX
75	M10980075	SPALSH GUARD
76	XPS68M	PHLP HD SCR M6-1 X 10
77	XPS47M	PHLP HD SCR M6-1 X 25
78	XPN01M	HEX NUT M6-1
79	M10980079	OIL PLATE
80	XPS68M	PHLP HD SCR M6-1 X 10
81	M10980081	COVER
82	M10980082	LEFT BED STAND
83	M10980083	BED STAND
84	M10980084	COVER
85	XPS68M	PHLP HD SCR M6-1 X 10
86	XPS68M	PHLP HD SCR M6-1 X 10
87	M10980087	COVER
88	XPSB73M	CAP SCREW M12-1.75 X 50
89	M10980089	LEFT PLATE BRACKET
90	XPS68M	PHLP HD SCR M6-1 X 10
91	M10980091	PLATE
92	M10980092	RIGHT PLATE BRACKET
93	M10980093	BREAK SHAFT
94	XPRP40M	ROLL PIN 2.5 X 12
95	M10980095	BRAKE PULL ROD
96	M1098096	CAP-SHAPE SCREW
97	XPN01M	HEX NUT M6-1
98	XPRP40M	ROLL PIN 2.5 X 12
99	M10980099	PEDAL ARM
100	M10980100	CONNECTING SHAFT
101	M10980101	DRAW SPRING
102	M10980102	SWITCH BLOCK
103	XPS39M	PHLP HD SCR M8-1.25 X 10
104	XPRP28M	ROLL PIN 5 X 40
105	M10980105	DRIVING SHAFT (LONG)
106	XPRP05M	ROLL PIN 5 X 30
107	M10980107	DRVING SHAFT (SHORT)
108	M10980108	PEDAL
109	XPSB71M	CAP SCREW M10-1.5 X 60
110	XPN02M	HEX NUT M10-1.5
111	M10980111	BRAKE ROD SUPPORT
200	M10980200	SPINDLE MOTOR

Headstock Case and Shift Controls Diagram
(1000 Series Parts)

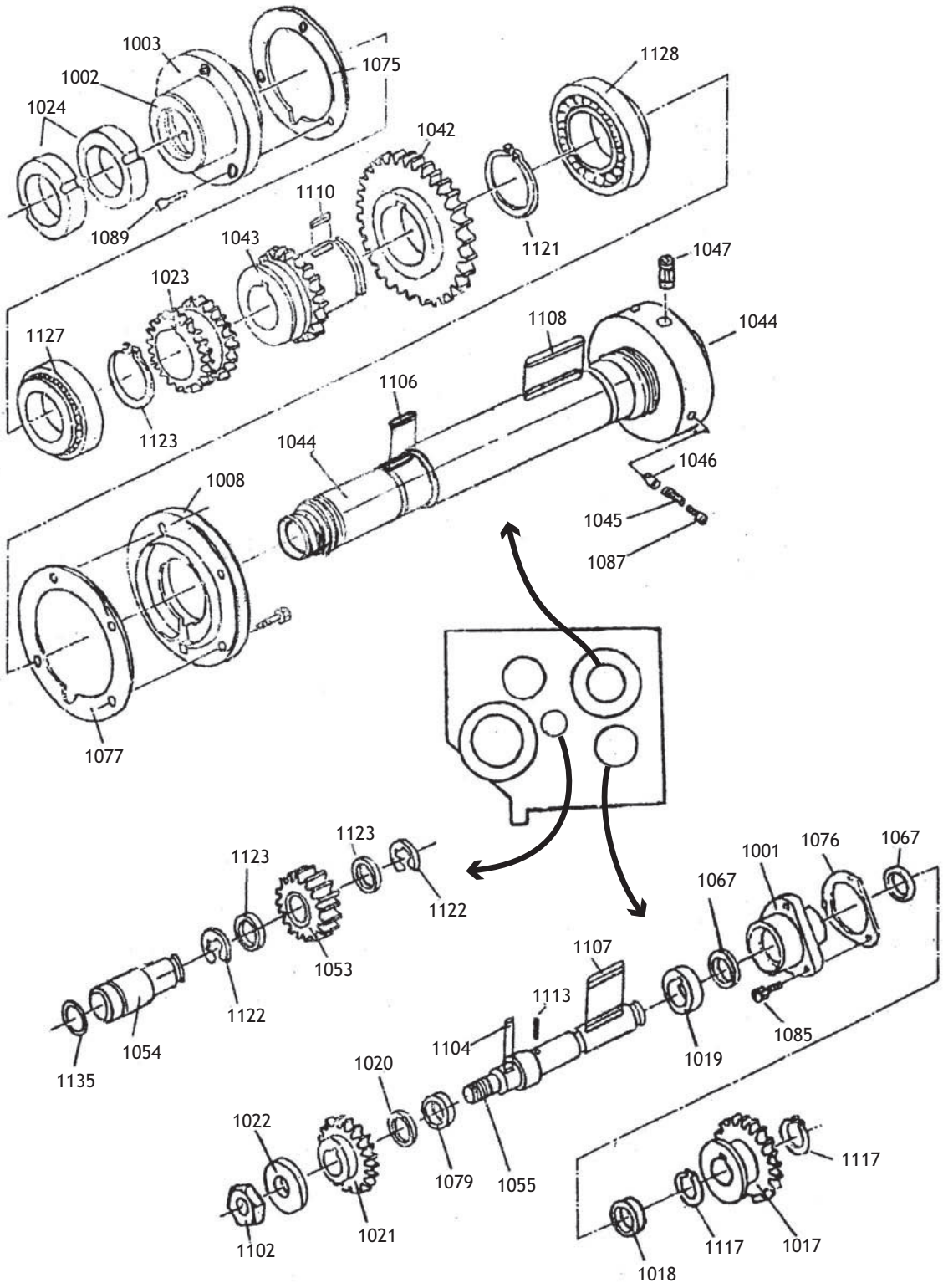


PARTS

Primary and Secondary Drive Diagram
(1000 Series Parts)



Spindle and Feed Gear Drive Diagram
(1000 Series Parts)



1000 Series Parts List

REF	PART #	DESCRIPTION
1001	XM10981001	COLLAR
1002	XM10981002	COLLAR
1003	XM10981003	REAR COVER
1004	XM10981004	REAR COVER
1005	XM10981005	PULLEY
1006	XM10981006	PLUG
1007	XM10981007	MAIN CASTING
1008	XM10981008	FRONT COVER
1009	XM10981009	SHIFT LEVER
1010	XM10981010	SHAFT HOUSING
1011	XM10981011	COVER
1012	XM10981012	HANDLE BODY
1013	XM10981013	CRANK SHAFT
1014	XM10981014	HANDLE BODY
1015	XM10981015	HANDLE BLOCK
1016	XM10981016	HUB
1017	XM10981017	GEAR 37T
1018	XM10981018	SPACER
1019	XM10981019	SLOTTED COLLAR
1020	XM10981020	THRUST WASHER
1021	XM10981021	GEAR 40T
1022	XPW06M	FLAT WASHER M12-1.75
1023	XM10981023	GEAR 37T
1024	XM10981024	SPANNER NUT
1025	XM10981025	GEAR 43T
1026	XM10981026	GEAR 51T
1027	XM10981027	SPACER
1028	XM10981028	GEAR SHAFT 16T
1029	XM10981029	COVER
1030	XM10981030	CAST WASHER
1031	XM10981031	SHAFT
1032	XM10981032	SPACER
1033	XM10981033	COLLAR W/GEAR 21T
1034	XM10981034	GEAR 29T
1035	XM10981035	GEAR 46T
1036	XM10981036	GEAR 38T
1037	XM10981037	COLLAR
1038	XM10981038	GEAR 26T
1039	XM10981039	GEAR 34T
1040	XM10981040	GEAR 53T
1041	XM10981041	PLUG
1042	XM10981042	GEAR 74T
1043	XM10981043	GEAR 37T
1044	XM10981044	SPINDLE
1045	XM10981045	SPRING
1046	XM10981046	PIN
1047	XM10981047	CAM
1048	XM10981048	SHAFT
1050	XM10981050	GEAR 51T

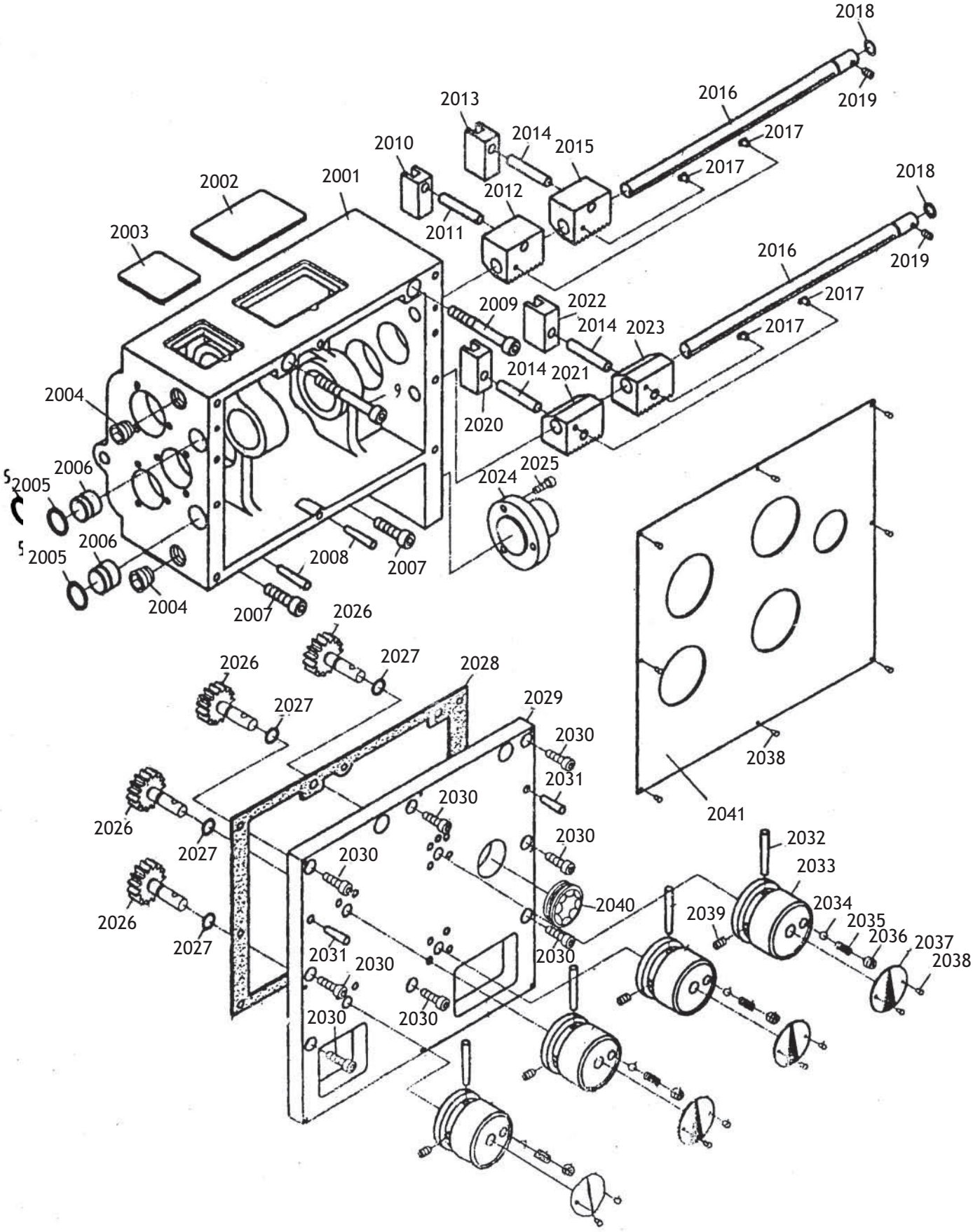
REF	PART #	DESCRIPTION
1051	XM10981051	ANCHOR PIN
1052	XM10981052	SHAFT
1053	XM10981053	GEAR 30T
1054	XM10981054	SHAFT
1055	XM10981055	SHAFT
1056	XM10981056	THRUST WASHER
1057	XM10981057	GEAR SHAFT 17T
1059	XM10981059	SPECIAL SHOULDER SCREW
1064	XM10981064	LEVER
1065	XM10981065	LEVER
1066	XM10981066	LEVER
1067	XM10981067	COLLAR
1068	XM10981068	SHIFT FORK
1069	XM10981069	SHIFT FORK
1073	XM10981073	GASKET
1074	XM10981074	GASKET
1075	XM10981075	GASKET
1076	XM10981076	GASKET
1077	XM10981077	GASKET
1078	XM10981078	GASKET
1079	XM10981079	OIL SEAL
1080	XM10981080	OIL SEAL
1084	XPS02M	PHLP HD SCR M4-.7 X 12
1085	XPSB24M	CAP SCREW M5-.8 X 16
1086	XPSB01M	CAP SCREW M6-1 X 16
1087	XPSB14M	CAP SCREW M8-1.25 X 20
1088	XPSB02M	CAP SCREW M6-1 X 20
1089	XPSB06M	CAP SCREW M6-1 X 25
1093	XPSS04M	SET SCREW M6-1 X 12
1095	XPSS20M	SET SCREW M8-1.25 X 8
1096	XPSS16M	SET SCREW M8-1.25 X 10
1097	XPSS14M	SET SCREW M8-1.25 X 12
1099	XPS42M	PHLP HD SCR M8-1.25 X 35
1100	XPS38M	PHLP HD SCR M4-.7 X 10
1102	XPN09M	HEX NUT M12-1.75
1103	XPK20M	KEY 5 X 5 X 15
1104	XPK14M	KEY 5 X 5 X 18
1105	XPK36M	KEY 5 X 5 X 50
1106	XPK11M	KEY 6 X 6 X 40
1107	XPK49M	KEY 6 X 6 X 55
1108	XPK50M	KEY 6 X 6 X 120
1109	XPK50M	KEY 6 X 6 X 120
1110	XPK51M	KEY 8 X 8 X 18
1111	XPK34M	KEY 5 X 5 X 20
1113	XPRP44M	ROLL PIN 3 X 10
1114	XPRP01M	ROLL PIN 4 X 18
1117	PR09M	EXT RETAINING RING 20
1119	PR12M	EXT RETAINING RING 35

1000 Series Parts List

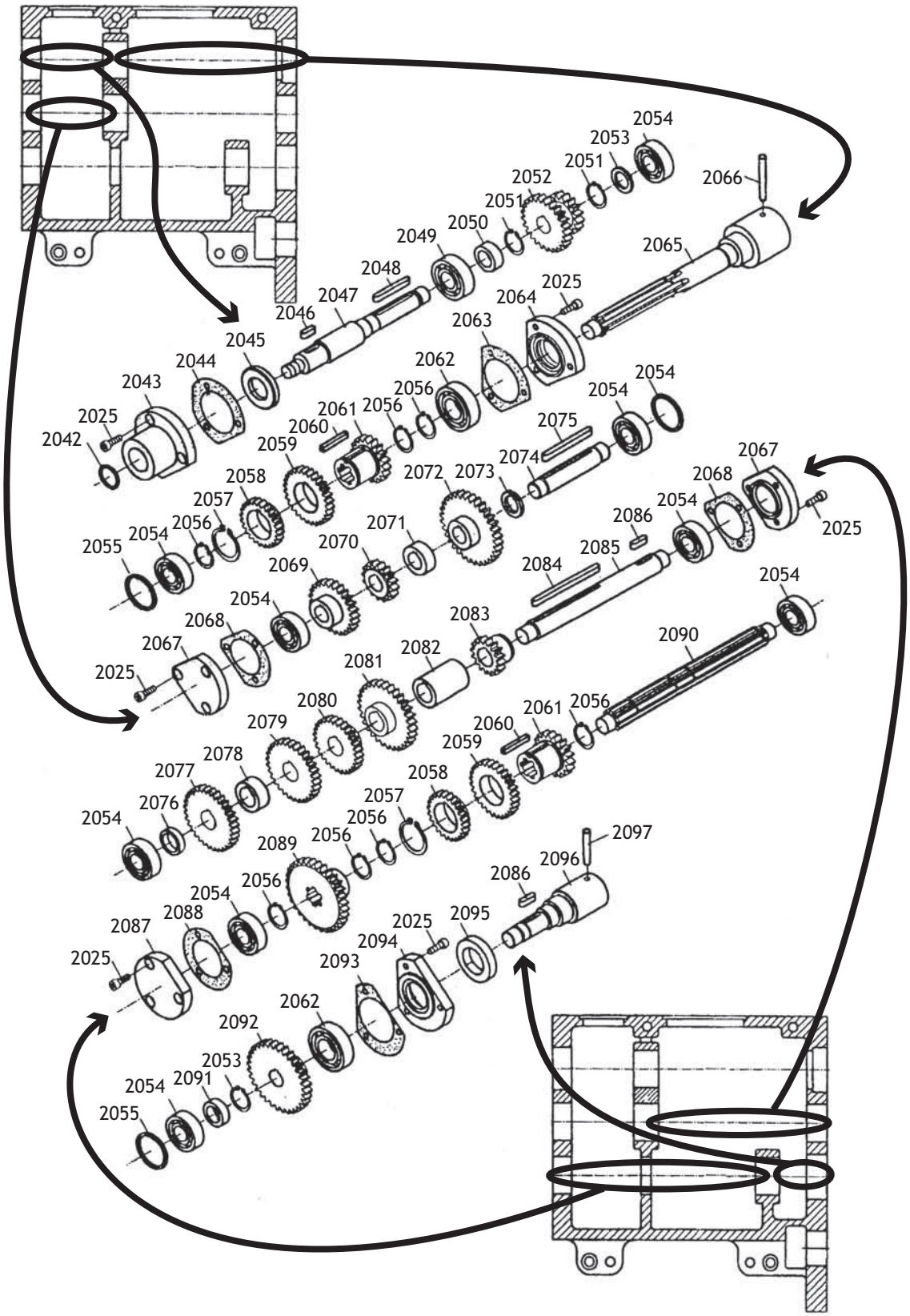
REF	PART #	DESCRIPTION
1120	PR43M	EXT RETAINING RING 50MM
1121	XPR44M	EXT RETAINING RING 72
1122	XM1019322	E-CLIP 42
1123	XM10981123	BEARING 700104E
1124	XM10981124	BEARING 240E
1125	XP203	BEARING 203
1126	XM10981126	BEARING 204D
1127	XM10981127	BEARING 7210E
1128	XM10981128	BEARING 7212D
1129	XM10981129	STEEL BALL 5
1130	XM10981130	STEEL BALL 6
1133	XM10981133	O-RING 2.4 X 14
1134	XM10981134	O-RING 2.4 X 20
1135	XM10981135	O-RING 2.4 X 25
1136	XM10981136	O-RING 3.1 X 30
1137	XM10981137	O-RING 3.1 X 40

REF	PART #	DESCRIPTION
1138	XM10981138	O-RING 3.1 X 47
1139	XM10981139	COMPRESSION SPRING 1 X 6 X 7
1140	XM10981140	COMPRESSION SPRING 1 X 6 X 25
1141	XM10981141	COMPRESSION SPRING 0.9 X 4.4 X 19
1142	XM10981142	SHIFT HUB
1147	XM10981147	LEVER SLEEVE
1148	XM10981148	COVER
1151	XPSB84M	CAP SCREW M10-1.5 X 35
1152	XM10981152	CONNECTING BOARD
1153	XPRP49M	ROLL PIN 5 X 25
1154	XM10981154	SHAFT
1155	XM10981155	BREAK SHAFT
1156	PR03M	EXT RETAINING RING 12
1157	XM10981157	BREAK SHOE
1158	XM10981158	POSITIONING AXLE
1159	PR39M	EXT RETAINING RING 8

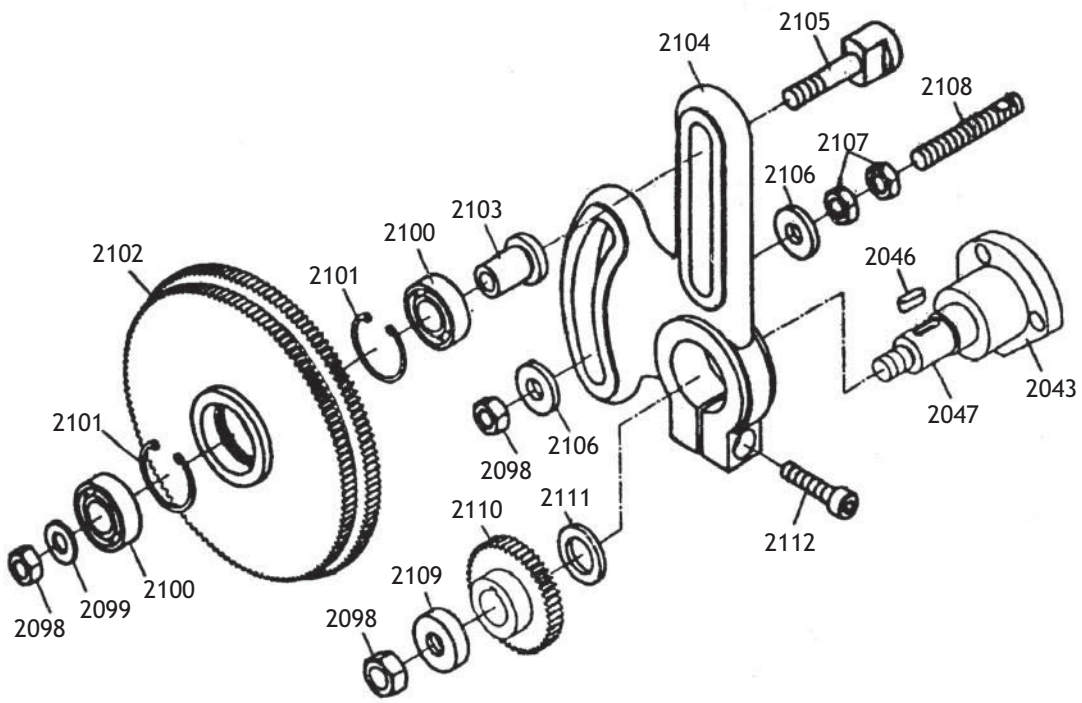
Gearbox Housing and Shift Controls Diagram
(2000 Series Parts)



Gearbox Drivetrain Diagram
(2000 Series Parts)



Gearbox Change Gear and Adjuster Diagram
(2000 Series Parts)



2000 Series Parts List

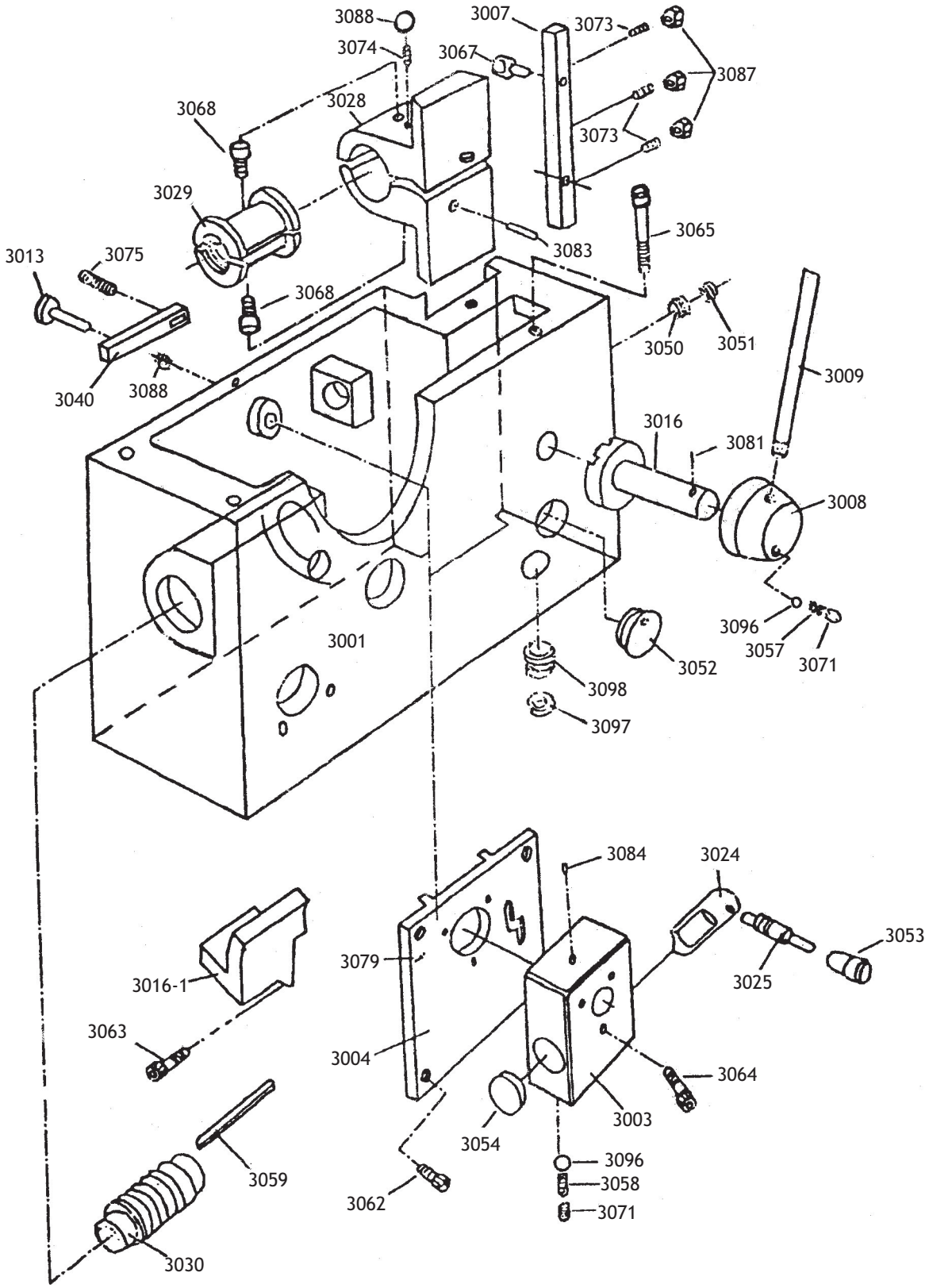
REF	PART #	DESCRIPTION
2001	XM10982001	CASTING
2002	XM10982002	LARGE CASTING COVER
2003	XM10982003	LARGE CASTING COVER
2004	XM10982004	DRAIN OIL FITTING
2005	XM10982005	"O"-RING 17 X 1.8
2006	XM10982006	SLIDING BLOCK
2007	XPSB66M	CAP SCREW M8-1.25 X 65
2008	XM10982008	TAPER PIN 6 X 30
2009	XM10982009	EXTENSION FASTNER M8-1.25
2010	XM10982010	BLOCK
2011	XPRP08M	ROLL PIN 6 X 30
2012	XM10982012	RACK
2013	XM10982013	BLOCK
2014	XPRP08M	ROLL PIN 6 X 30
2015	XM10982015	RACK
2016	XM10982016	SHAFT
2017	XM10982017	RETAINING DOG
2018	XM10982018	"O"-RING 8.75 X 1.8
2019	XPSS31M	SET SCREW M5-.8 X 8
2020	XM10982020	BLOCK
2021	XM10982021	RACK
2022	XM10982022	BLOCK
2023	XM10982023	RACK
2024	XM10982024	CONTROL ROD SUPPORT
2025	XPSB24M	CAP SCREW M5-.8 X 16
2026	XM10982026	GEAR
2027	XM10982027	"O"-RING 7 X 1.9
2028	XM10982028	GASKET
2029	XM10982029	FEED BOX COVER
2030	XPSB06M	CAP SCREW M6-1 X 25
2031	XM10982031	TAPER PIN 5 X 25
2032	XPRP28M	ROLL PIN 5 X 40
2033	XM10982033	LEVER SUPPORT
2034	XM10982034	STEEL BALL 6 MM
2035	XM10982035	COMPRESSION SPRING 1 X 5 X 20
2036	XPSS06M	SET SCREW M8-1.25 X 16
2037	XM10982037	LABEL
2038	XM10982038	SPECIAL SCREW M3-.5 X 4
2039	XPSS03M	SET SCREW M6-1 X 8
2040	XM10982040	OIL SIGHT GLASS
2041	XM10982041	LABEL
2042	XM10982042	SPECIAL RING 26 X 2.4
2043	XM10982043	BEARING COVER
2044	XM10982044	GASKET
2045	XM10982045	THRUST WASHER
2046	XPK33M	KEY 5 X 5 X 45
2047	XM10982047	VII AXLE
2048	XPK33M	KEY 5 X 5 X 45
2049	XP6203	BEARING 6203
2050	XM10982050	BUSHING
2051	XM10982051	SPECIAL CLIP
2052	XM10982052	GEAR
2053	XM10982053	THRUST WASHER
2054	XP6204	BEARING 6004
2055	XM10982055	THRUST WASHER
2056	XPR09M	EXT RETAINING RING 20MM
2057	XPR19M	EXT RETAINING RING 28MM
2058	XM10982058	GEAR
2059	XM10982059	GEAR
2060	XPK38M	KEY 4 X 4 X 22
2061	XM10982061	GEAR
2062	XP6204	BEARING 6004
2063	XM10982063	GASKET
2064	XM10982064	BEARING COVER
2065	XM10982065	XI AXLE
2066	XPRP29M	ROLL PIN 5 X 45
2067	XM10982067	BEARING COVER
2068	XM10982068	GASKET
2069	XM10982069	GEAR
2070	XM10982070	GEAR
2071	XM10982071	BUSHING
2072	XM10982072	GEAR
2073	XM10982073	BUSHING
2074	XM10982074	VIII AXLE
2075	XPK71M	KEY 4 X 4 X 45
2076	XM10982076	BUSHING
2077	XM10982077	GEAR
2078	XM10982078	BUSHING
2079	XM10982079	GEAR
2080	XM10982080	GEAR
2081	XM10982081	GEAR
2082	XM10982082	BUSHING
2083	XM10982083	GEAR
2084	XPK93M	KEY 4 X 4 X 80
2085	XM10982085	X AXLE
2086	XPK102M	KEY 4 X 4 X 18
2087	XM10982087	BEARING COVER
2088	XM10982088	GASKET
2089	XM10982089	GEAR
2090	XM10982090	IX AXLE
2091	XM10982091	BUSHING
2092	XM10982092	GEAR
2093	XM10982093	GASKET

2000 Series Parts List

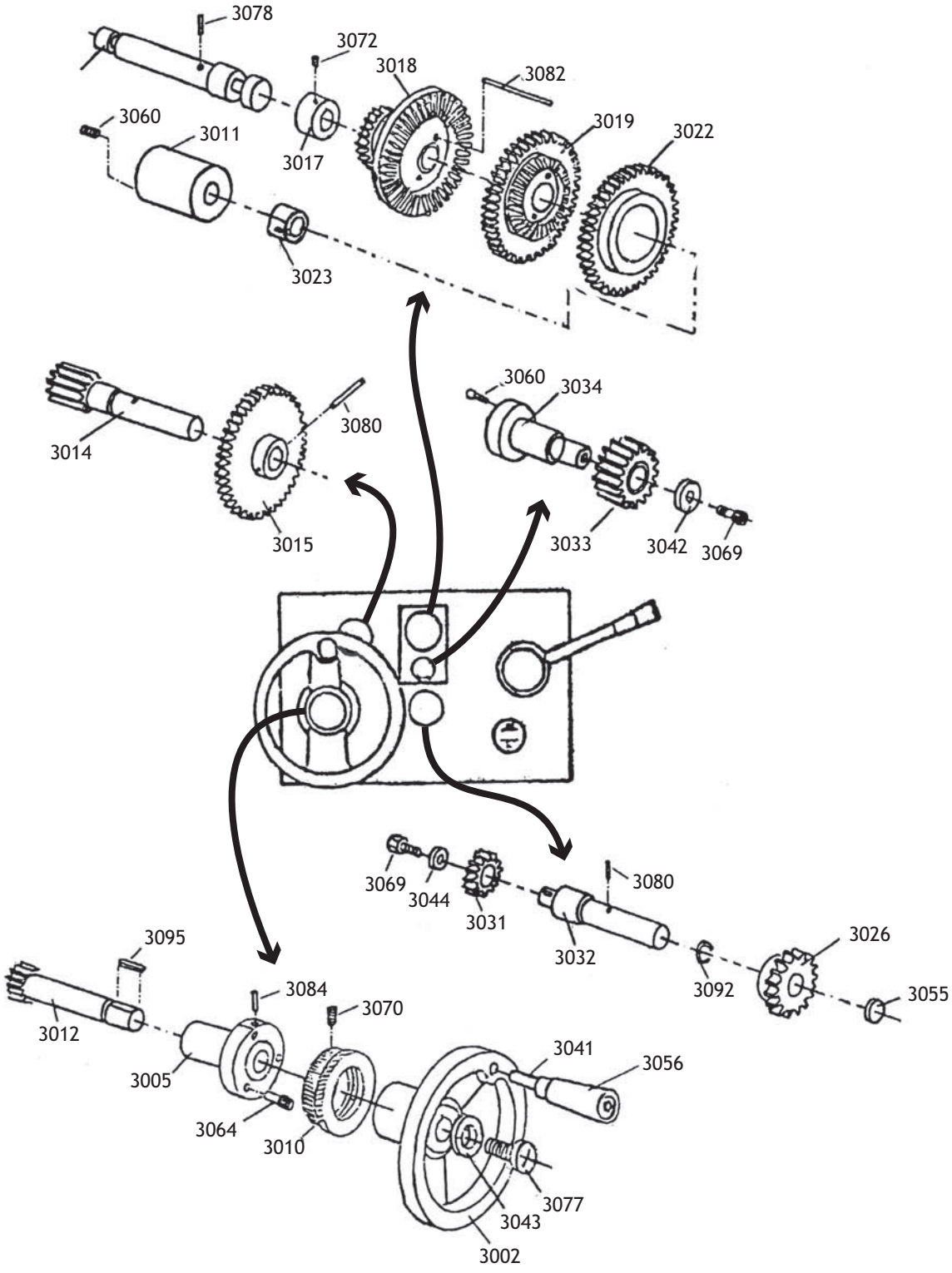
REF	PART #	DESCRIPTION
2094	XM10982094	BEARING COVER
2095	XM10982095	SPECIAL RING 25 X 40 X 7
2096	XM10982096	XII AXLE
2097	XPRP10M	ROLL PIN 5 X 35
2098	XPN09M	HEX NUT M12-1.75
2099	XM10982099	THRUST WASHER
2100	XM10982100	BEARING 600
2101	XPR21M	INT RETAINING RING 35MM
2102	XM10982102	GEAR
2103	XM10982103	SLEEVE

REF	PART #	DESCRIPTION
2104	XM10982104	GEAR COVER
2105	XM10982105	SPECIAL SHOULDER BOLT
2106	XM10982106	WIDE-CAST WASHER
2107	XPN02M	HEX NUT M10-1.5
2108	XM10982108	STUD M10-1.5
2109	XM10982109	WIDE-CAST WASHER
2110	XM10982110	GEAR
2111	XM10982111	THRUST WASHER
2112	XPSB06M	CAP SCREW M6-1 X 25

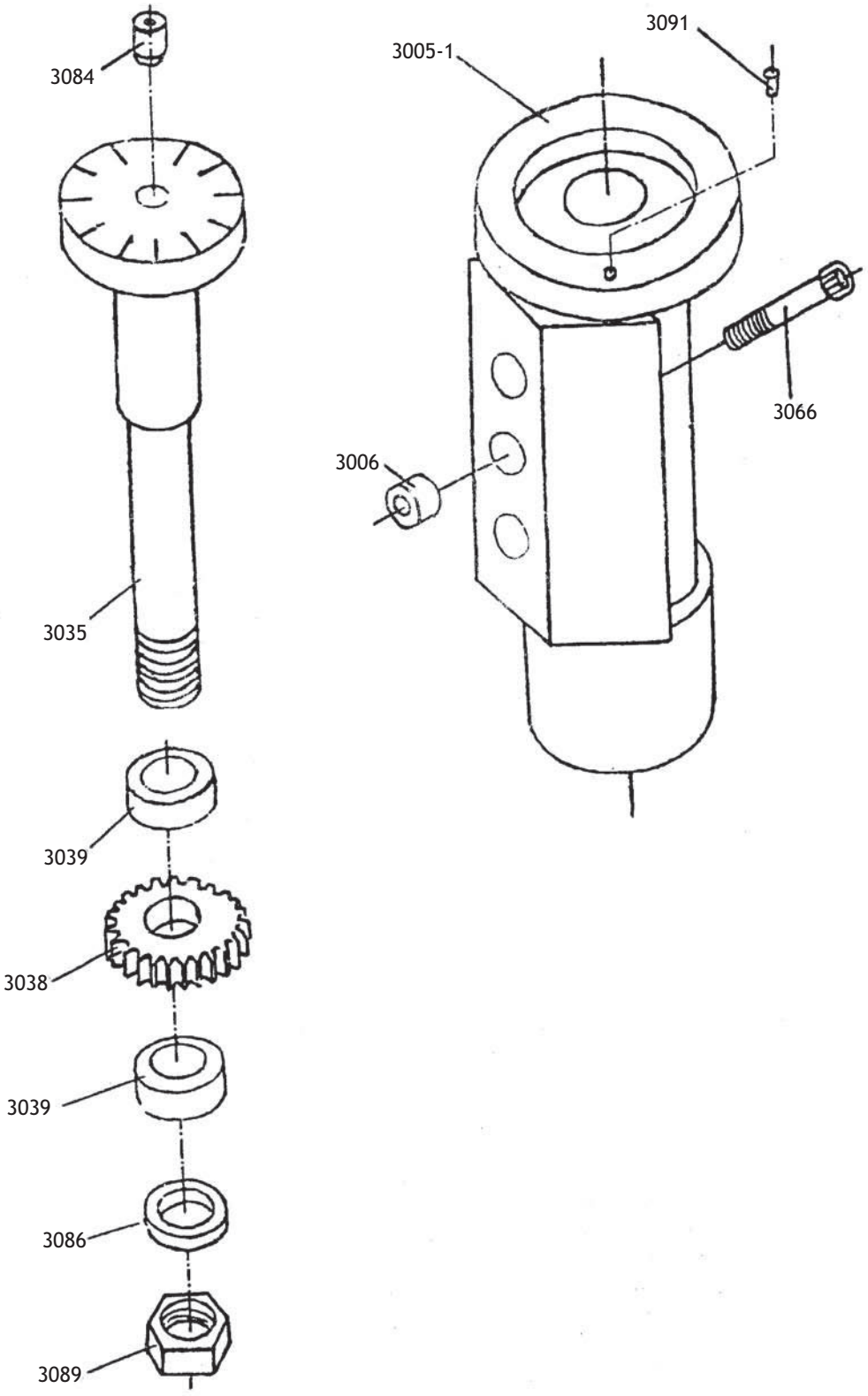
Apron Housing and Shifting Controls Diagram
(3000 Series Parts)



Apron Housing and Shifting Controls Diagram
(3000 Series Parts)



Thread Dial Diagram
(3000 Series Parts)

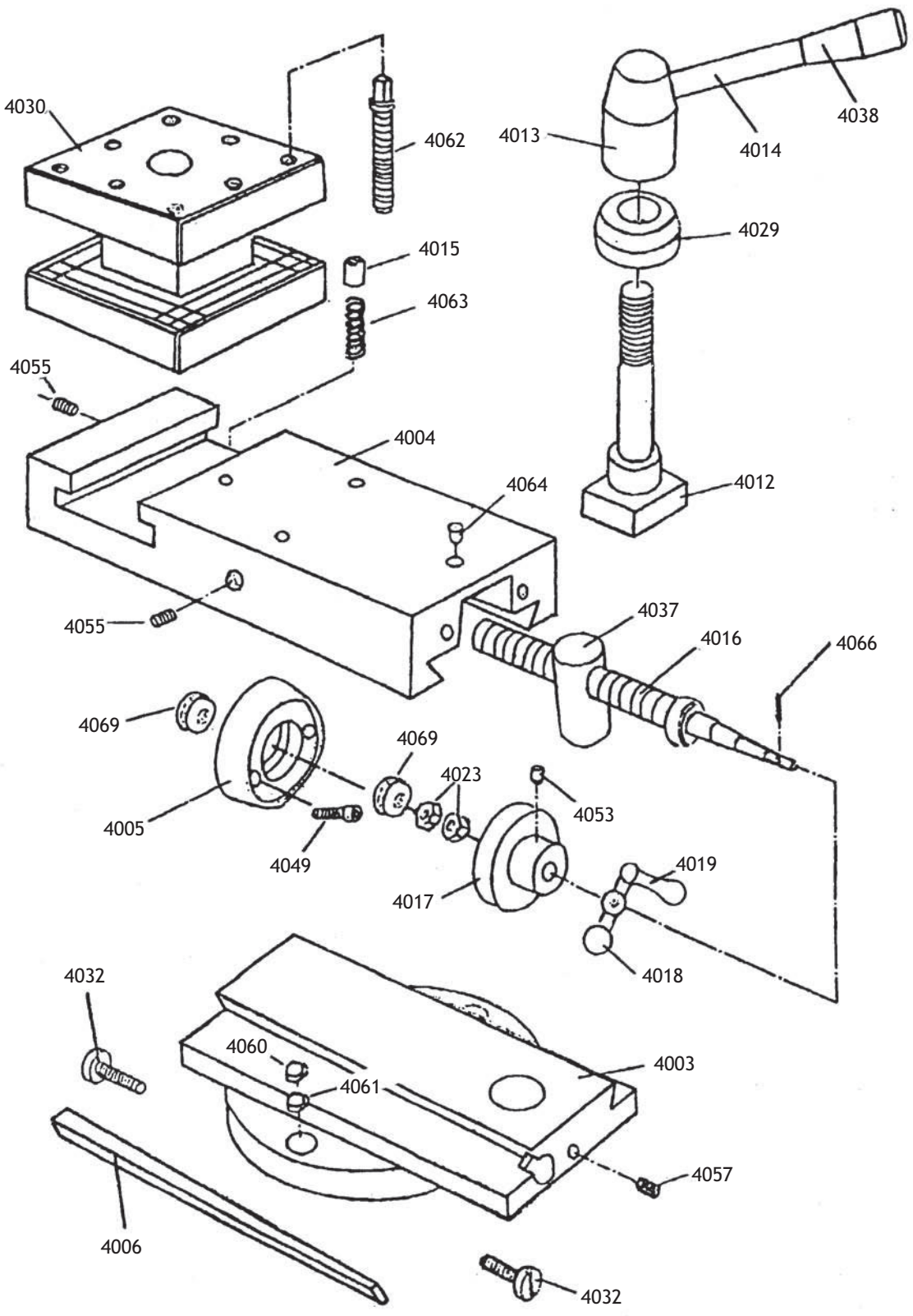


3000 Series Parts List

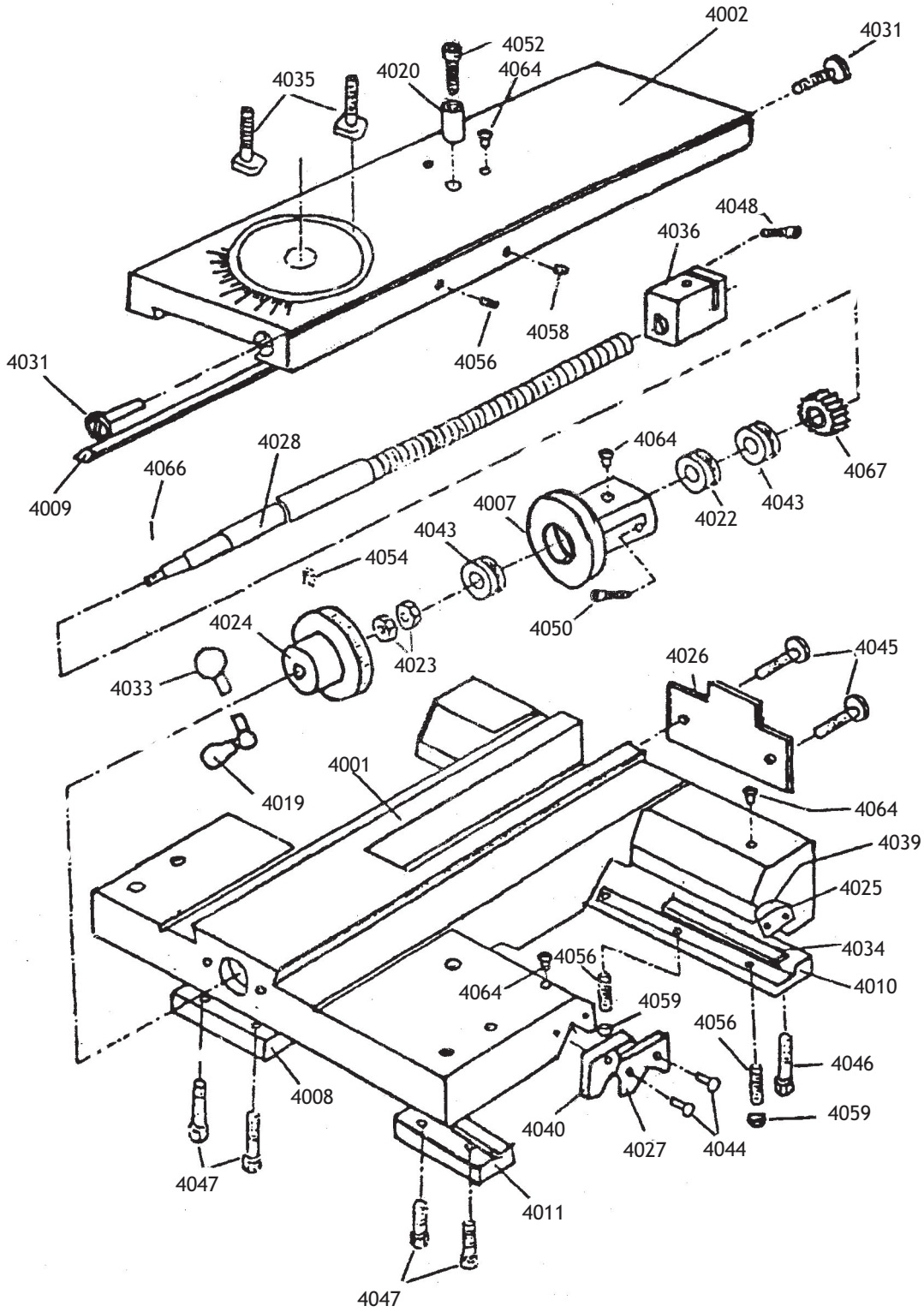
REF	PART #	DESCRIPTION
3001	XM10983001	CASTING
3002	XM10983002	HANDWHEEL
3003	XM10983003	BOX
3004	XM10983004	COVER
3005	XM10983005	THREADING DIAL BODY
3005-1	XM10983005-1	HUB
3006	XM10983006	SPACER
3007	XM10983007	GIB
3008	XM10983008	HUB
3009	XM10983009	SHAFT
3010	XM10983010	INDEX RING
3011	XM10983011	COVER
3012	XM10983012	SHAFT
3013	XM10983013	GEAR ROLL PIN 60T
3014	XM10983014	GEAR SHAFT 18T
3015	XM10983015	GEAR
3016	XM10983016	SHAFT
3016-1	XM10983016-1	BRACKET
3017	XM10983017	COVER
3018	XM10983018	GEAR 30T
3019	XM10983019	GEAR 46T
3022	XM10983022	GEAR 63T
3023	XM10983023	SHIFT FORK
3024	XM10983024	SHIFT LEVER
3025	XM10983025	SHIFT HANDLE
3026	XM10983026	GEAR 40T
3028	XM10983028	BRACKET
3029	XM10983029	HALF NUT
3030	XM10983030	WORM
3031	XM10983031	GEAR 22T
3032	XM10983032	SHAFT
3033	XM10983033	GEAR 18T
3034	XM10983034	SHAFT
3035	XM10983035	THREADING DIAL BODY
3038	XM10983038	COMBO GEAR 32T/30T/28T
3039	XM10983039	SPACER
3040	XM10983040	BAR
3041	XM10983041	HANDLE STUD
3042	XM10983042	CAST WASHER
3043	XM10983043	CAST WASHER
3044	XM10983044	CAST WASHER
3050	XM10983050	OIL SIGHT COLLAR

REF	PART #	DESCRIPTION
3051	XM10983051	OIL SIGHT COLLAR
3052	XM10983052	OIL SIGHT
3053	XM10983053	HANDLE
3054	XM10983054	PLUG"A"
3055	XM10983055	PLUG"B"
3056	XM10983056	HANDLE
3057	XM10983057	COMPRESSION SPRING
3058	XM10983058	CPMPRESSION SPRING
3059	XM10983059	SPECIAL KEY
3060	XPSB33M	CAP SCREW M5-.8 X 12
3062	XPSB26M	CAP SCREW M6-1 X 12
3063	XPSB01M	CAP SCREW M6-1 X 16
3064	XPSB06M	CAP SCREW M6-1 X 25
3065	XPSB13M	CAP SCREW M8-1.25 X 30
3066	XPSB05M	CAP SCREW M8-1.25 X 50
3067	XPS40M	PHLP HD SCR M5-.8 X 16
3068	XPSB26M	CAP SCREW M6-1 X 12
3069	XPS68M	PHLP HD SCR M6-1 X 10
3070	XPSS26M	SET SCREW M5-.8 X 6
3071	XPSS02M	SET SCREW M6-1 X 6
3072	XPSS01M	SET SCREW M6-1 X 10
3073	XPSS34M	SET SCREW M5-.8 X 16
3074	XPSS29M	SET SCREW M6-1 X 35
3075	XPSS01M	SET SCREW M6-1 X 10
3077	XPS14M	PHLP HD SCR M6-1 X 12
3078	XPRP16M	ROLL PIN 3 X 25
3079	XPRP03M	ROLL PIN 5 X 20
3080	XPRP05M	ROLL PIN 5 X 30
3081	XPRP45M	ROLL PIN 5 X 32
3082	XPRP49M	ROLL PIN 5 X 25
3083	XPRP41M	ROLL PIN 6 X 12
3084	XM10983084	OILER 8 MM
3086	XPW01M	FLAT WASHER 8MM
3087	XPN06M	HEX NUT M5-.8
3088	XPN01M	HEX NUT M6-1
3089	XPN03M	HEX NUT M8-1.25
3091	XM10983091	RIVET 3 X 8
3092	XM10983092	O-RING 20 X 2.4
3095	XPK14M	KEY 5 X 5 X 18
3096	XM10983096	STEEL BALL
3097	XPW04M	FLAT WASHER 10 MM
3098	XM10983098	PLUG M10 X 1

Tool Post, Top Slide, and Swivel Slide Diagram
(4000 Series Parts)



Saddle and Cross Slide Diagram
(4000 Series Parts)

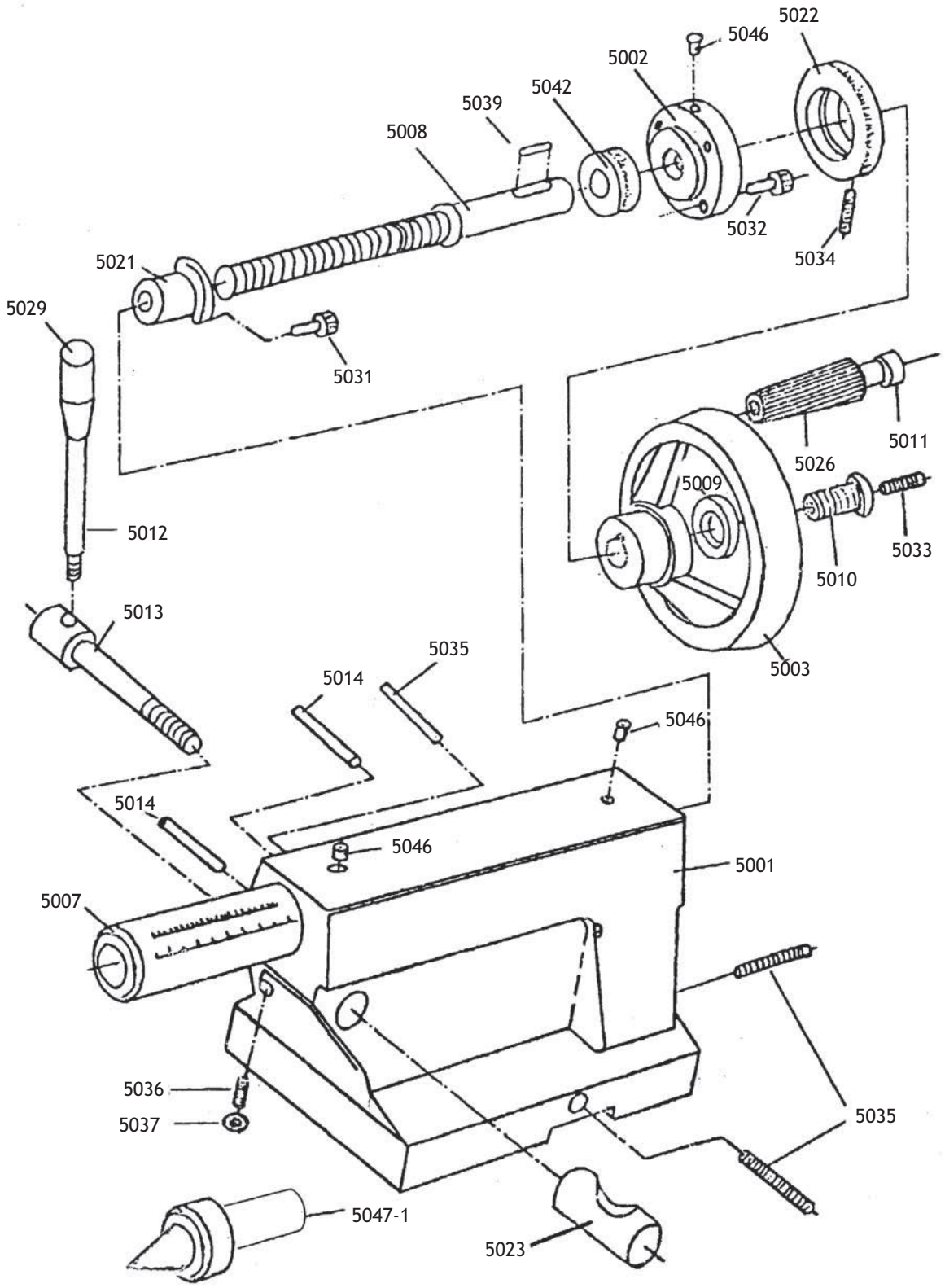


4000 Series Parts List

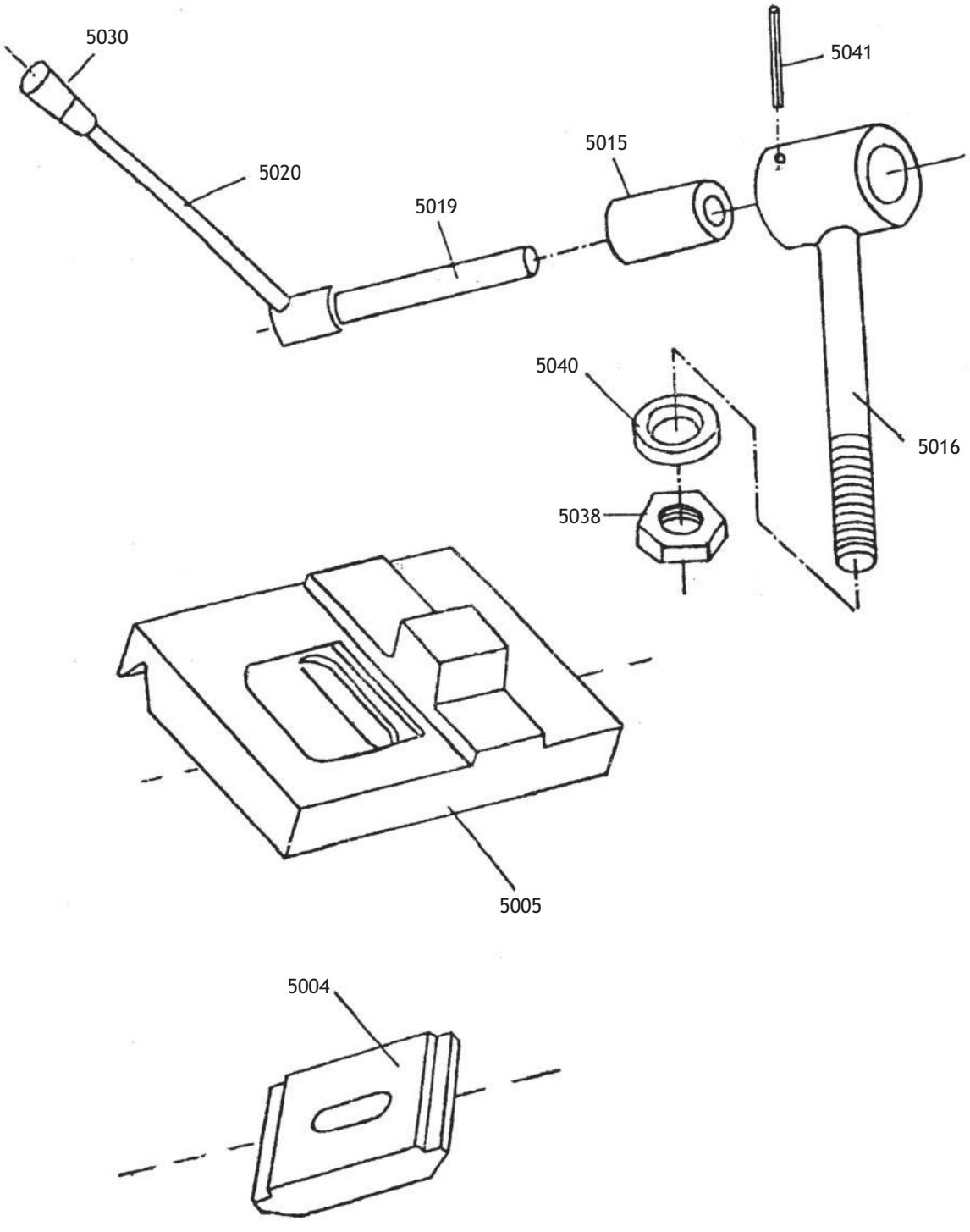
REF	PART #	DESCRIPTION
4001	XM10984001	SADDLE
4002	XM10984002	CROSS SLIDE
4003	XM10984003	SWIVEL SLIDE
4004	XM10984004	TOPSLIDE
4005	XM10984005	COLLAR
4006	XM10984006	GIB
4007	XM10984007	HUB
4008	XM10984008	STRIP
4009	XM10984009	GIB
4010	XM10984010	STRIP
4011	XM10984011	FRONT STRIP
4012	XM10984012	T-BOLT
4013	XM10984013	HANDLE BASE
4014	XM10984014	HANDLE SHAFT
4015	XM10984015	STOP
4016	XM10984016	LEAD SCREW
4017	XM10984017	INDEX RING
4018	XM10984018	BALL END CRANK
4019	XM10984019	HANDLE
4020	XM10984020	COLLAR
4022	XM10984022	THRUST WASHER
4023	XM10984023	SPECIAL NUT
4024	XM10984024	INDEX RING
4025	XM10984025	PLATE
4026	XM10984026	PLATE W/WIPER
4027	XM10984027	PLATE
4028	XM10984028	LEAD SCREW
4029	XM10984029	LOAD WASHER
4030	XM10984030	POST BASE
4031	XM10984031	GIB ADJUSTING SCREW
4032	XM10984032	GIB ADJUSTING SCREW
4033	XM10984033	BALL END CRANK

REF	PART #	DESCRIPTION
4034	XM10984034	GIB STRIP
4035	XM10984035	T-BLOCK
4036	XM10984036	BLOCK
4037	XM10984037	DRAG NUT
4038	XM10984038	FEMALE KNOB M8-1.25
4039	XM10984039	WIPER
4040	XM10984040	WIPER
4043	XP8102	THRUST BEARING 8102
4044	XPS02M	PHLP HD SCR M4-.7 X 12
4045	XPS76M	PHLP HD SCR M8-1.25 X 12
4046	XPB09M	HEX BOLT M8-1.25 X 20
4047	XPB09M	HEX BOLT M8-1.25 X 20
4048	XPSB01M	CAP SCREW M6-1 X 16
4049	XPSB02M	CAP SCREW M6-1 X 20
4050	XPSB06M	CAP SCREW M6-1 X 25
4052	XPSB11M	CAP SCREW M8-1.25 X 16
4053	XPSS02M	SET SCREW M6-1 X 6
4054	XPSS03M	SET SCREW M6-1 X 8
4055	XPSS01M	SET SCREW M6-1 X 10
4056	XPSS11M	SET SCREW M6-1 X 16
4057	XPSS20M	SET SCREW M8-1.25 X 8
4058	XPSS16M	SET SCREW M8-1.25 X 10
4059	XPN01M	HEX NUT M6-1
4060	XPN03M	HEX NUT M8-1.25
4061	XPW01M	FLAT WASHER 8MM
4062	XM10984062	TOOL POST SCREW M10-1.5 X 40
4063	XM10984063	COMPRESSION SPRING 0.64 X 4 X 18
4064	XM10984064	OIL BALL 8
4066	XPRP02M	ROLL PIN 3 X 16
4067	XPRP42M	ROLL PIN 3 X 20
4069	XM10984069	BALL BEARING

Tailstock Diagram
(5000 Series Parts)



Tailstock Clamp and Base Diagram
(5000 Series Parts)

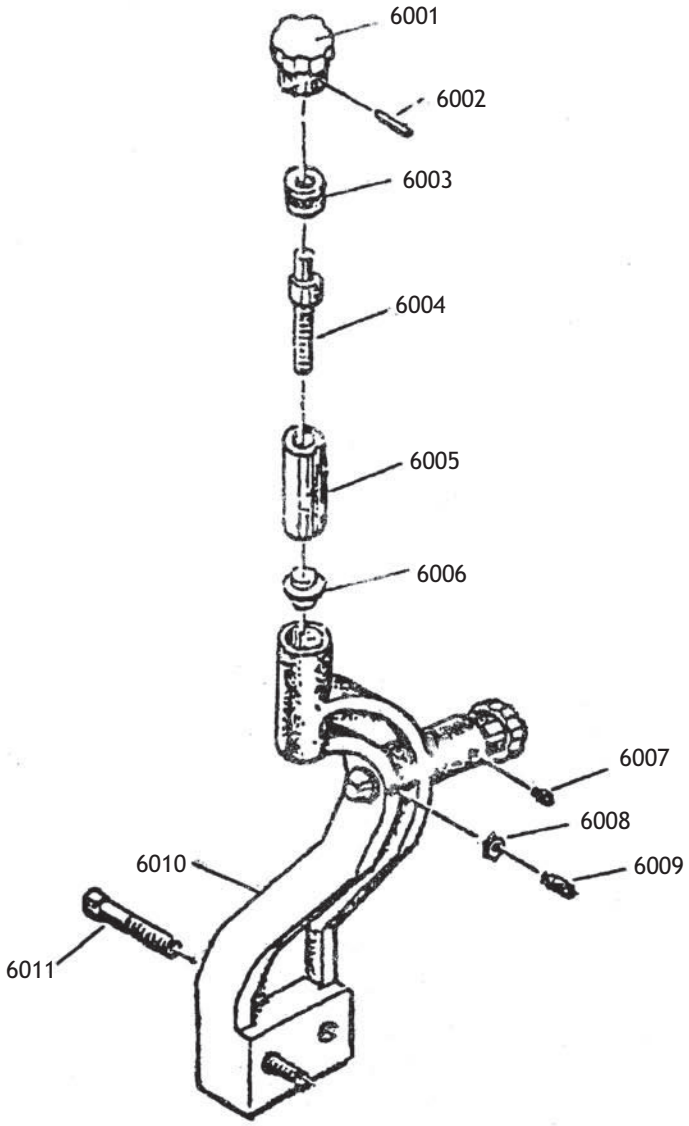


5000 Series Parts List

REF	PART #	DESCRIPTION
5001	XM10985001	CASTING
5002	XM10985002	FLANGE COVER
5003	XM10985003	HANDWHEEL
5004	XM10985004	CLAMP PLATE
5005	XM10985005	BASE
5007	XM10985007	QUILL
5008	XM10985008	LEAD SCREW
5009	XM10985009	SHOULDER WASHER
5010	XM10985010	SPECIAL SCREW
5011	XM10985011	SPECIAL SCREW
5012	XM10985012	LEVER STUD M8-1.25 X 40
5013	XM10985013	SHAFT
5014	XM10985014	SPECIAL STOP SCREW
5015	XM10985015	COLLAR
5016	XM10985016	PIVOT STUD
5019	XM10985019	SHAFT
5020	XM10985020	LEVER STUD M10-1.5 X 50
5021	XM10985021	SHOULDER NUT
5022	XM10985022	INDEX RING

REF	PART #	DESCRIPTION
5023	XM10985023	PIVOT BLOCK
5026	XM10985026	HANDLE
5029	XM10985029	FEMALE KNOB M8-1.25
5030	XM10985030	FEMALE KNOB M10-1.5
5031	XPSB17M	CAP SCREW M4-.7 X 10
5032	XPSB01M	CAP SCREW M6-1 X 16
5033	XPSS57M	SET SCREW M5-.8 X 20
5034	XPSS01M	SET SCREW M6-1 X 10
5035	XM10985035	SPECIAL STOP SCREW
5036	XPSS74M	SET SCREW M8-1.25 X 35
5037	XPN03M	HEX NUT M8-1.25
5038	XPN09M	HEX NUT M12-1.75
5039	XPK47M	KEY 4 X 4 X 15
5040	XPW06M	FLAT WASHER 12MM
5041	XPRP06M	ROLL PIN 5 X 24
5042	XP51102	THRUST BEARING 51102
5046	XM10985046	OIL BALL 8 MM
5047-1	XM10985047-1	LIVE CENTER MT-3

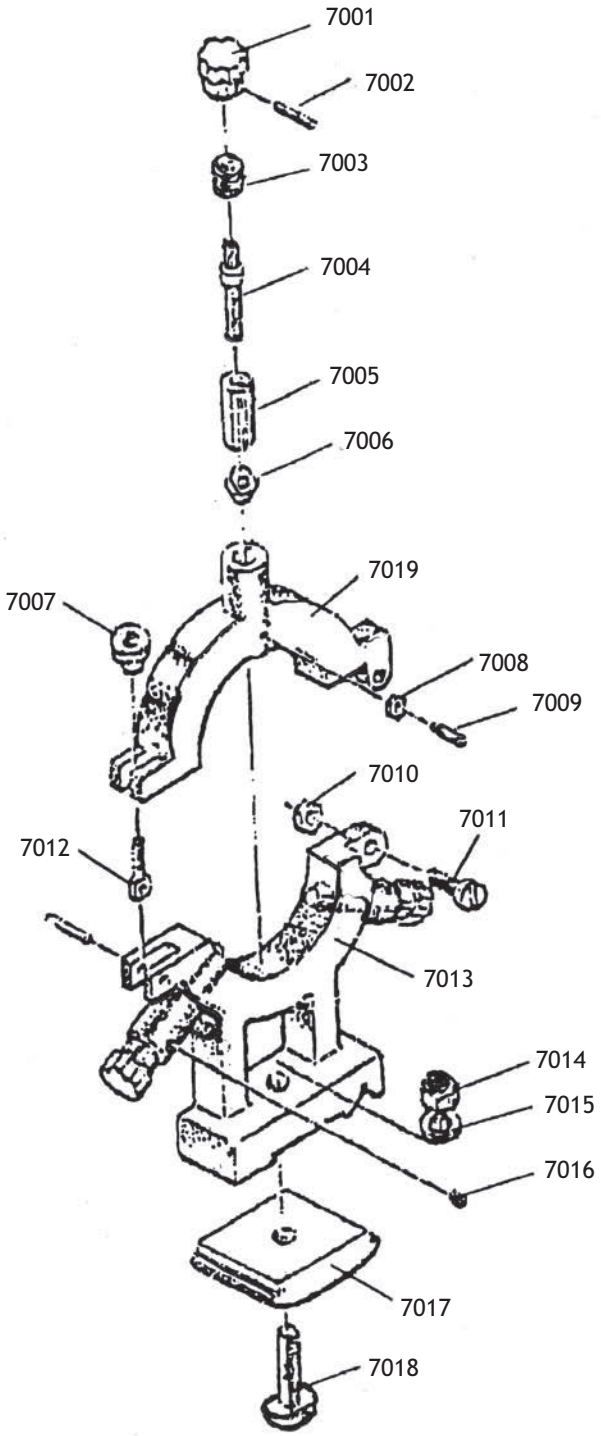
Follow Rest Diagram
(6000 Series Parts)



6000 Series Parts List

REF	PART #	DESCRIPTION
6001	XM10986001	PINNED KNOB
6002	XPRP15M	ROLL PIN 3 X 8
6003	XM10986003	BUSHING
6004	XM10986004	SPECIAL SCREW
6005	XM10986005	SLEEVE
6006	XM10986006	BRASS FINGER
6007	XPSS02M	SET SCREW M6-1 X 6
6008	XPN01M	HEX NUT M6-1
6009	XPSS25M	SET SCREW M6-1 X 20
6010	XM10986010	BASE CASTING
6011	XPSB45M	CAP SCREW M8-1.25 X 45

Steady Rest Diagram
(7000 Series Parts)

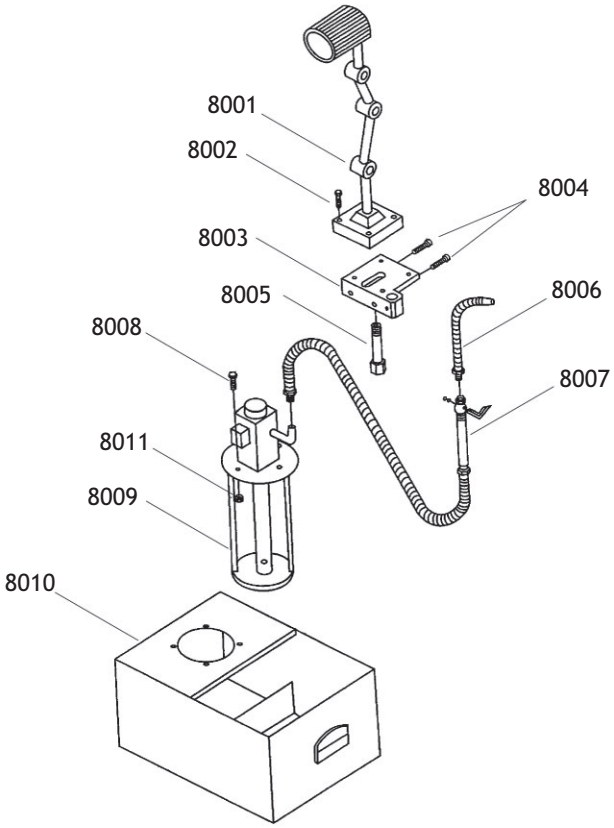


7000 Series Parts List

REF	PART #	DESCRIPTION
7001	XM10987001	PINNED KNOB
7002	XPRP64M	ROLL PIN 3 X 18
7003	XM10987003	BUSHING
7004	XM10987004	SPECIAL SCREW
7005	XM10987005	SLEEVE
7006	XM10987006	BRASS FRINGER
7007	XM10987007	KNOB M10-1.5
7008	XPN01M	HEX NUT M6-1
7009	XPSS25M	SET SCREW M6-1 X 20
7010	XPN01M	HEX NUT M6-1

REF	PART #	DESCRIPTION
7011	XPB29M	HEX BOLT M6-1 X 30
7012	XM10987012	PIVOT BOLT
7013	XM10987013	BASE CASTING
7014	XPN09M	HEX NUT M12-1.75
7015	XPW06M	FLAT WASHER 12MM
7016	XPSS02M	SET SCREW M6-1 X 6
7017	XM10987017	CLAMP PAD
7018	XM10987018	CLAMP SCREW
7019	XM10987019	TOP CASTING

Pump and Work Light Diagram
(8000 Series Parts)

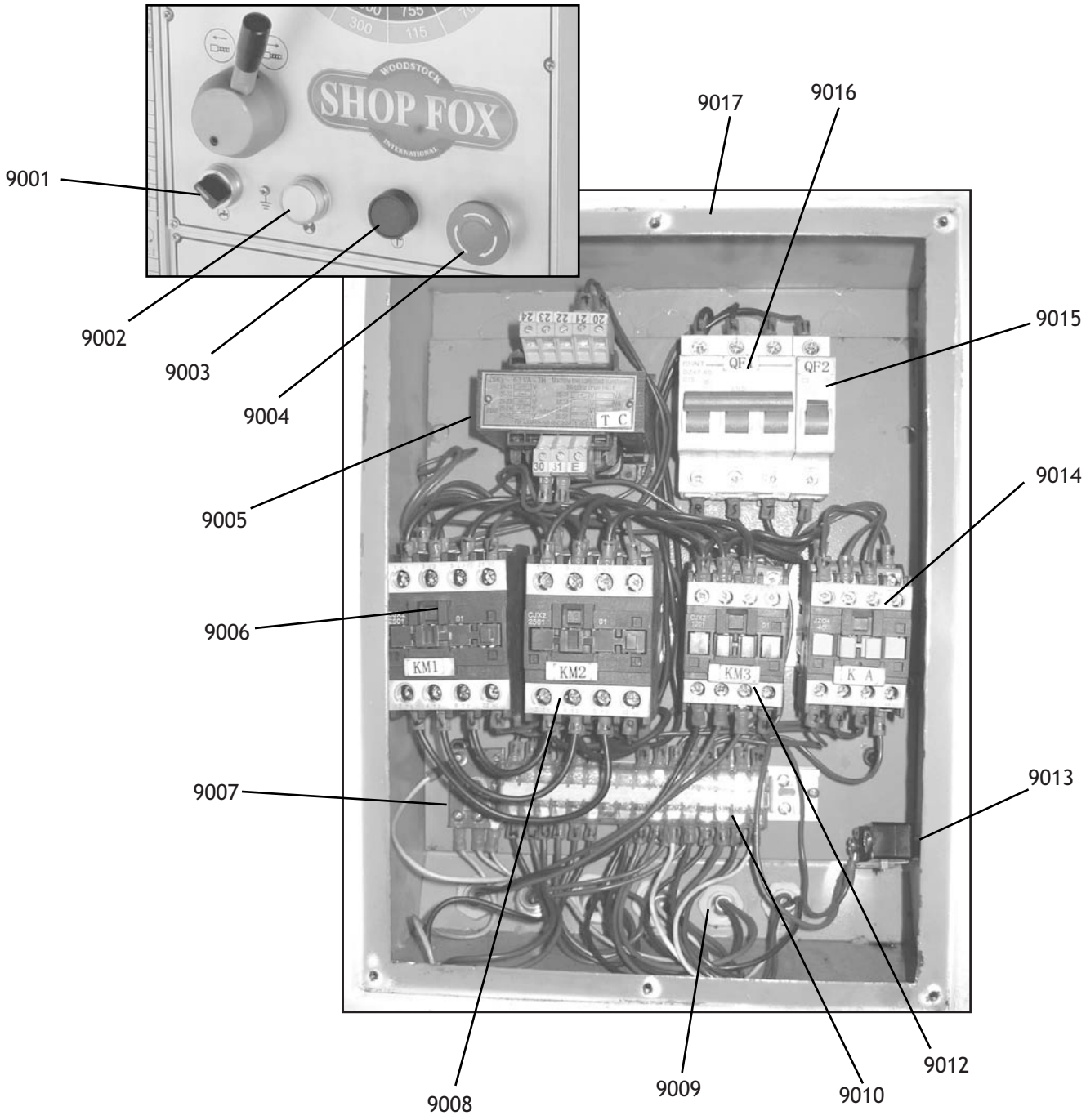


8000 Series Parts List

REF	PART #	DESCRIPTION
8001	XM10988001	WORK LIGHT
8002	XPS15M	PHLP HD SCR M6-1 X 14
8003	XM10988003	LAMP BRACKET
8004	XPSB02M	CAP SCREW M6-1 X 20
8005	XM10988005	CONNECTED TUBE
8006	XM10988006	COOLANT PUMP

REF	PART #	DESCRIPTION
8007	XM10988007	RUBBER TUBE
8008	XPSB38M	CAP SCREW M5-.8 X 25
8009	XM10988009	COOLANT PUMP 1/8 HP
8010	XM10988010	WATER TANK
8011	XPN06M	HEX NUT M5-.8

Main Wiring Box and Controls Diagram
(9000 Series Parts)



9000 Series Parts List

REF	PART #	DESCRIPTION
9001	XM10989001	SWITCH ASSEMBLY
9002	XM10989002	LAMP ASSEMBLY
9003	XM10989003	PUSHBUTTON ASSEMBLY
9004	XM10989004	EMERGENCY STOP SWITCH ASSEMBLY
9005	XM10989005	TRANSFORMER
9006	XM10989006	CONTACTOR
9007	XM10989007	TERMANAL BLOCK
9008	XM10989008	CONTACTOR

REF	PART #	DESCRIPTION
9009	XM10989009	STRAIN RELIEF
9010	XM10989010	TERMINAL BUS
9012	XM10989012	CONTACTOR
9013	XM10989013	LIMIT SWITCH
9014	XM10989014	CONTACTOR
9015	XM10989015	CIRCUIT BREAKER
9016	XM10989016	CIRCUIT BREAKER
9017	XM10989017	ELECTRICAL BOX AND DOOR

WARRANTY

Woodstock International, Inc. warrants all Shop Fox machinery to be free of defects from workmanship and materials for a period of two years from the date of original purchase by the original owner. This warranty does not apply to defects due directly or indirectly to misuse, abuse, negligence or accidents, lack of maintenance, or reimbursement of third party expenses incurred.

Woodstock International, Inc. will repair or replace, at its expense and at its option, the Shop Fox machine or machine part, which in normal use has proven to be defective, provided that the original owner returns the product prepaid to a Shop Fox factory service center with proof of their purchase of the product within two years, and provides Woodstock International, Inc. reasonable opportunity to verify the alleged defect through inspection. If it is determined there is no defect, or that the defect resulted from causes not within the scope of Woodstock International Inc.'s warranty, then the original owner must bear the cost of storing and returning the product.

This is Woodstock International, Inc.'s sole written warranty and any and all warranties that may be implied by law, including any merchantability or fitness, for any particular purpose, are hereby limited to the duration of this written warranty. We do not warrant that Shop Fox machinery complies with the provisions of any law or acts. In no event shall Woodstock International, Inc.'s liability under this warranty exceed the purchase price paid for the product, and any legal actions brought against Woodstock International, Inc. shall be tried in the State of Washington, County of Whatcom. We shall in no event be liable for death, injuries to persons or property or for incidental, contingent, special or consequential damages arising from the use of our products.

Every effort has been made to ensure that all Shop Fox machinery meets high quality and durability standards. We reserve the right to change specifications at any time because of our commitment to continuously improve the quality of our products.

Warranty Registration

Name_____

Street _____

City _____ State_____ Zip_____

Phone #_____ Email_____ Invoice #_____

Model #_____ Serial #_____ Dealer Name_____ Purchase Date_____

The following information is given on a voluntary basis. It will be used for marketing purposes to help us develop better products and services. ***Of course, all information is strictly confidential.***

1. How did you learn about us?

_____ Advertisement _____ Friend ____ Local Store
_____ Mail Order Catalog _____ Website ____ Other:

2. How long have you been a woodworker/metalworker?

_____ 0-2 Years _____ 2-8 Years ____ 8-20 Years _____ 20+ Years

3. How many of your machines or tools are Shop Fox?

_____ 0-2 _____ 3-5 ____ 6-9 _____ 10+

4. Do you think your machine represents a good value? _____ Yes ____ No

5. Would you recommend Shop Fox products to a friend? _____ Yes ____ No

6. What is your age group?

_____ 20-29 _____ 30-39 ____ 40-49
_____ 50-59 _____ 60-69 ____ 70+

7. What is your annual household income?

_____ $20,000-$29,000 _____ $30,000-$39,000 ____ $40,000-$49,000
_____ $50,000-$59,000 _____ $60,000-$69,000 ____ $70,000+

8. Which of the following magazines do you subscribe to?

____ Cabinet Maker
____ Family Handyman
____ Hand Loader
____ Handy
____ Home Shop Machinist
____ Journal of Light Cont.
____ Live Steam
____ Model Airplane News
____ Modeltec
____ Old House Journal
____ Popular Mechanics
____ Popular Science
____ Popular Woodworking
____ Practical Homeowner
____ Precision Shooter
____ Projects in Metal
____ RC Modeler
____ Rifle
____ Shop Notes
____ Shotgun News
____ Today's Homeowner
____ Wood
____ Wooden Boat
____ Woodshop News
____ Woodsmith
____ Woodwork
____ Woodworker West
____ Woodworker's Journal
____ Other:

9. Comments:_____

_____

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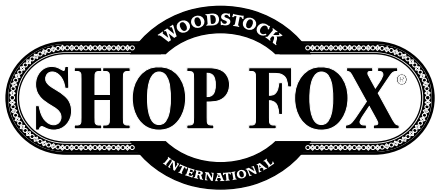

WOODSTOCK INTERNATIONAL INC.
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